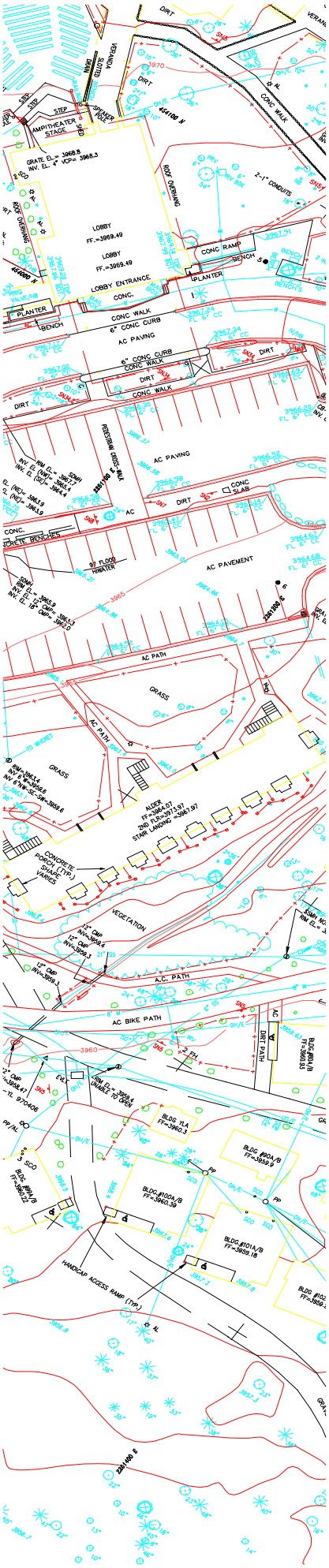


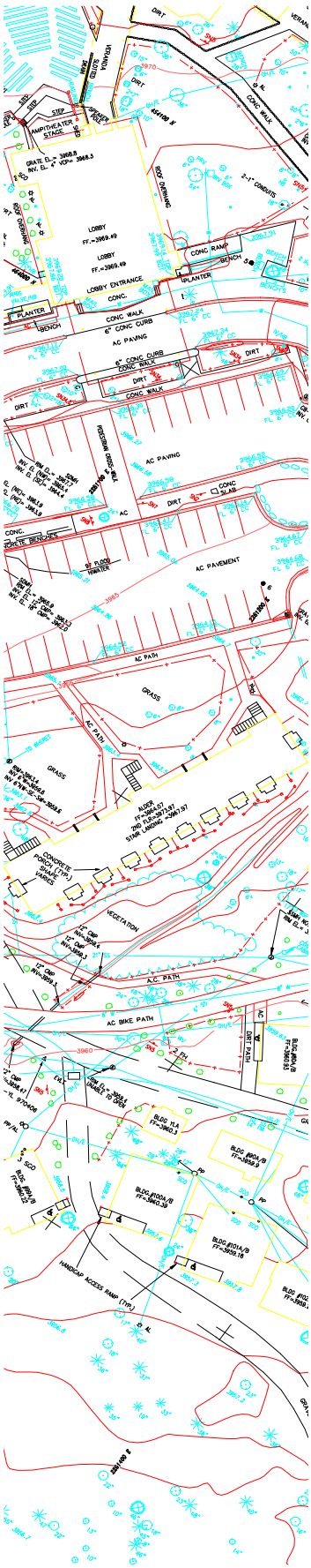
Denver Service Center

CADD
USER'S GUIDE

May 1999

Denver Service Center
National Park Service
Denver, Colorado

NATIONAL PARK SERVICE
DEPARTMENT OF THE INTERIOR



CADD
USER'S GUIDE

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CADD User's Guide

Denver Service Center
National Park Service
Denver, Colorado

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Introduction

The following standards are intended for Denver Service Center employees as well as architectural and engineering (A&E) contractors for use in the preparation of CADD generated design and construction drawings for the National Park Service.

The purpose of this documentation is to establish standards which will result in the preparation of consistent and compatible CADD files. It is intended to guide users in the overall CADD system operations and establish standards and procedures that will avoid duplication of effort and maintain uniformity of work.

This manual also contains operational guidelines for users of the AutoCAD system located at the Denver Service Center. It is to be considered a dynamic document from which increased experience, technological advancement, and industry wide standardization will provide future direction.

Suggestions for improvement are strongly encouraged so that subsequent updates will reflect the needs and input of the users, while striving to maintain the consistency necessary for life cycle maintainability. Recommendations or suggestions should be sent to Cheryl Everman, DSC CADD Coordinator.

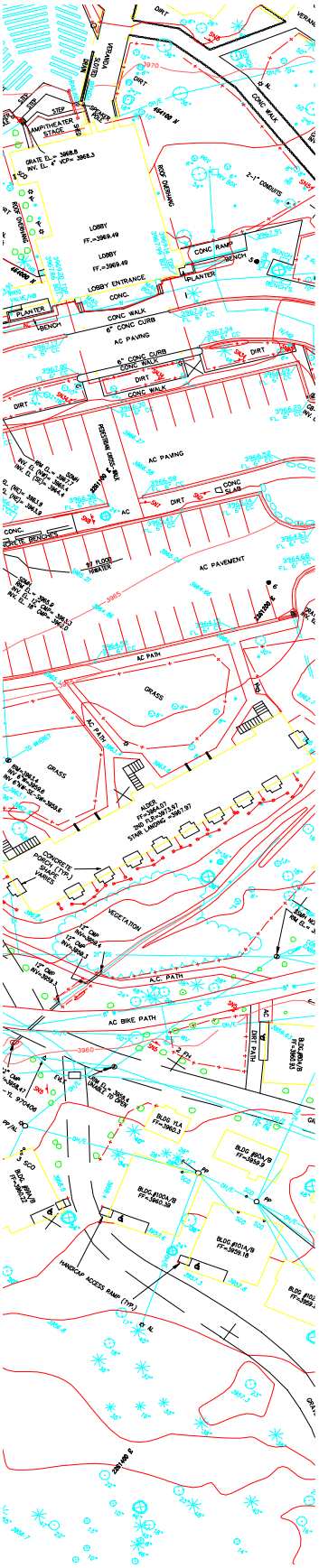
Purpose and Scope

The purpose of this manual is to set basic CADD standards to ensure consistent electronic deliverables for the NPS design and construction program. It provides guidance and procedures for preparing CADD products for the Denver Service Center that meet the necessary archival requirements. It also documents all standard files and customization that have been developed to support the DSC CADD program.

The support files and customization that have been created for AutoCAD users at the DSC will be available to all employees and A/E contractors for use in the preparation of design and construction drawings for the National Park Service. Many of the required drafting standards have been written into the support files and customization developed for AutoCAD Release 14. This document will focus on the CADD support and standards. Refer to NPS-10 Rel. 3, Guideline for Preparation of Design and Construction Drawings, for specific drafting requirements that may be transparent in the customization, but are not specifically addressed in this document. All standard files and customization written for AutoCAD Rel. 14 comply with NPS-10 Rel. 3.

All support files and customization accompanying this documentation will be supported via e-mail. Questions can be directed to Bruce Littlehorn, Technical Support Specialist, at: Bruce_Littlehorn@nps.gov.

Table of Contents



Chapter 1

General Standards

General Standards

These general standards are intended to include the fundamental requirements for the efficient use of the Denver Service Center CADD system. Some of these standards will be repeated and further explained in other more specific sections.

The following are the basic standards for the Denver Service Center.

All CADD drawings will be done in AutoCAD.

All drawings will be drawn at true scale and true coordinates in model space.

All plots will be made from paper space at 1:1.

All externally referenced (xref) drawings will be attached (or overlaid) into the subsheet at 0,0,0.

All line widths will be set at the plotter and not in the model.

All colors used in drawing files will comply with the DSC Pen/Color configuration.

All drawings will contain a date stamp that includes the AutoCAD release number, the drawing pathname, the filename, and the latest date worked on.

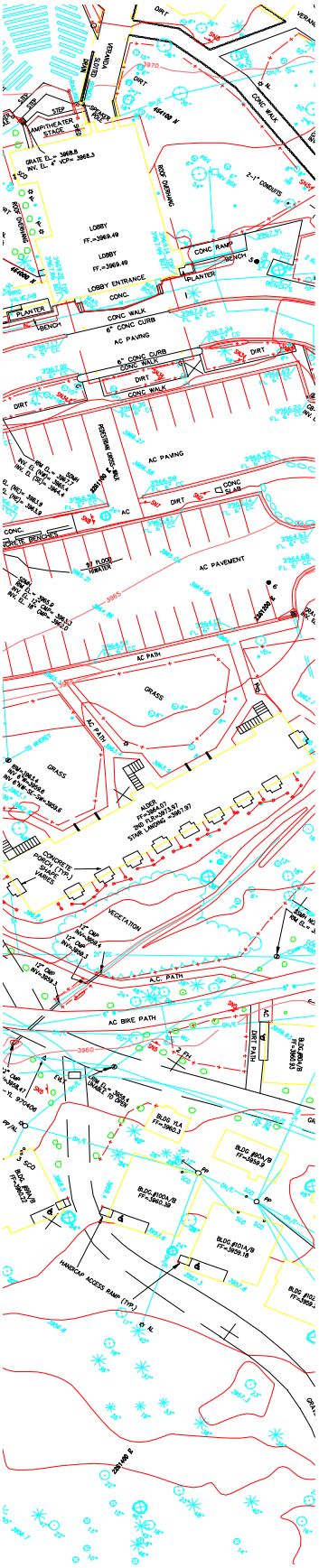
No changes or additions will be made to the base sheet by disciplines using this base as an external reference (xref).

Layer names will conform to DSC standards and all drawing elements will be drawn on the appropriate layer. All layers will be named using the discipline designation the drawing element represents as the first letter.

Each subsheet will be created as an individual CADD file, using external references for the sharing of information, when necessary. One single drawing file containing multiple subsheets is not acceptable.

All drawing pathnames shall follow the DSC folder structure and file naming conventions, which include mapping to a "P:" drive.

CADD drawings shall be produced in accordance with NPS-10, Guideline for Preparation of Design and Construction Drawings.



Chapter 2

Drawing Management

Drawing Management

To ensure accessibility of all drawing files and external references during ongoing design and construction efforts and for archival and retrieval purposes, it is imperative that we set and maintain a standard folder structure, beginning with a common drive letter.

Creating a P: Drive

Any user creating files for the Denver Service Center needs to map their working drive to the P: drive. This will allow us to maintain the drawing files as they come into our network, and to share working drawings, without having to rename or modify any pathnames before being able to load the drawings.

The following steps will allow you to create a P: drive on any computer not on the DSC network.

1. Create a primary folder to hold the files you need:

   C:\PROJECTS

2. Using the 'notepad' program, edit or create a file named c:\autoexec.bat Add this line:

   IF NOT EXIST P:\ SUBST P: C:\PROJECTS

3. Reboot your computer to access your P: drive.

All DSC project files shall be accessed from this common P: drive.

Folder and File Naming Conventions

File organization is a necessity in managing CADD drawings. By stacking folders, the user can distinguish between park, package no., project phase, discipline the drawing is associated with, and the specific filenames. All CADD users shall follow the specified folder structure and file naming conventions as shown below in preparing CADD drawings for the DSC. An expanded, more detailed version of these standards, with specific file naming conventions, can be found in Figure 2-1.

CADD File Management and Naming Conventions

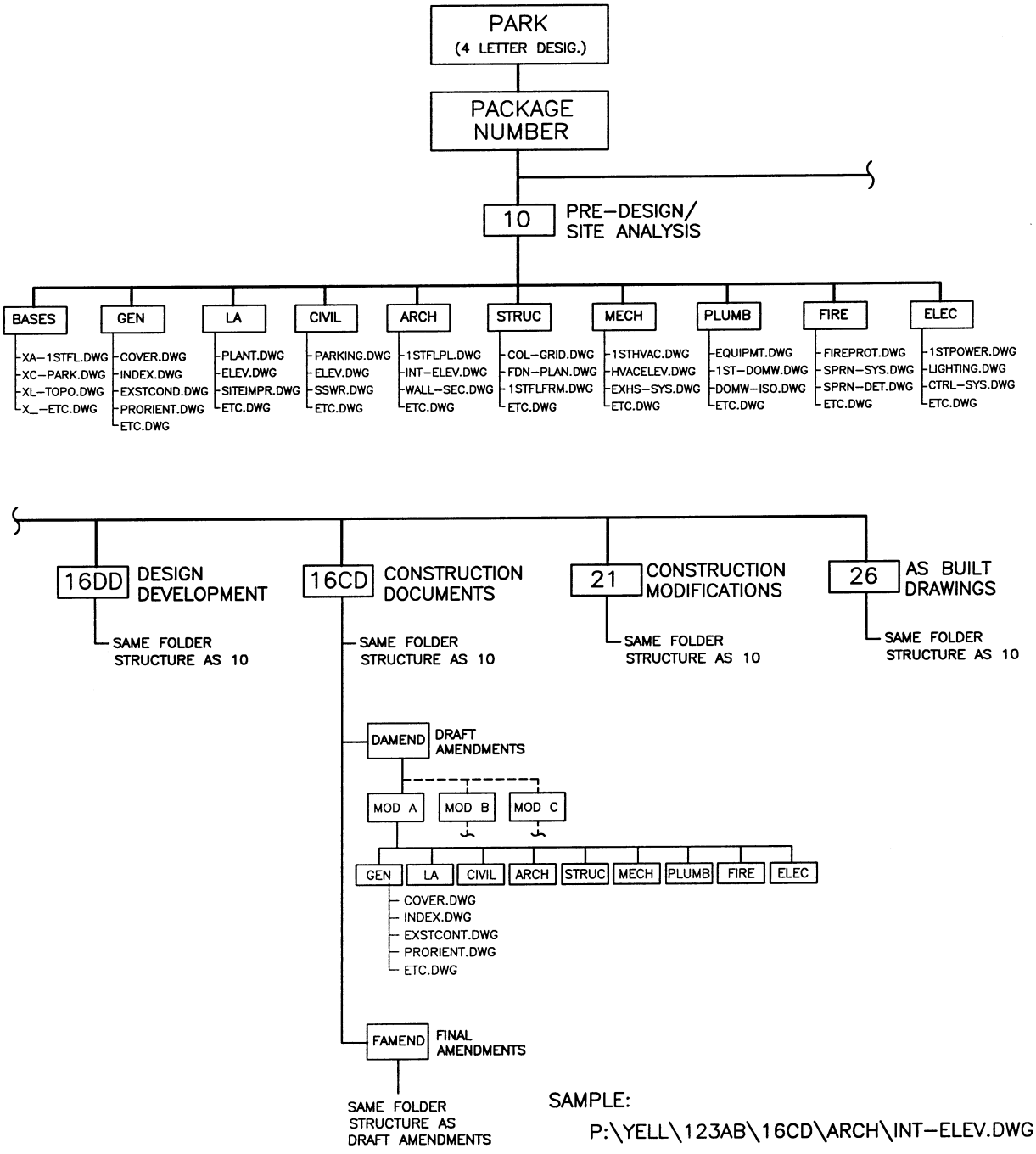


Figure 2-1

Folder Naming Conventions

To assure file sharing and accessibility to all users, the following folder structure should be used.

P:\	Disk Drive
PARK\	4 Letter Park Designation
PKG. NO.\	Project Package Number
PROJECT PHASE\	Project Phase (10,16DD,16CD,21,26)
DISCIPLINE or BASE\	Arch, Civil, LA, Mech, Elec, Base*, etc.
FILE NAME (.DWG)	Drawing Name

Example: p:\jela\467\16CD\arch\a1flor.dwg

* - The base folder is the designated location for storing all drawings that are created to be used as a "base" drawing and accessed as an external reference (xref). This folder is to be used for locating any base sheet needed by another discipline. (i.e.: mechanical designers may need to xref the architectural floor plan which will be used as the base for their mechanical design). All base drawings will be located in one folder, with the file name indicating the specific type of base. (See Base Folder File Naming)

File Naming

To assure file sharing and accessibility to all users, file names will consist of a maximum of eight (8) characters. The file name should try to best describe the design content of each specific drawing sheet. (See Figure 2-1 for additional sample file names.)

Examples

PLANTING.DWG
SITEDEMO.DWG
1ST-HVAC.DWG
PIPESCHE.DWG

Base Folder File Naming

In naming base drawings to be used as external references (xrefs), all files should begin with an "x", to distinguish it as an xref. The architectural base sheets shall begin with an xa, the civil base sheets shall begin with an xc, the landscape base sheets shall begin with an xl, etc. The remaining six digits should be as descriptive as possible in describing the content of the base sheet. Naming base drawings this way will generate consistency and organization within the final drawing.

Examples

XA-FLRPL.DWG
XC-SITE.DWG
XLLAYOUT.DWG
XEXCOND.DWG

Layering

The layering standards to be used on DSC CADD drawings follow, in general, the AIA CAD Layer Guidelines, prepared by the AIA Task Force on Cad Layer Guidelines.

The AIA CAD Layer Guidelines give two methods for sharing graphic information. The single file approach, in which drawings are created by turning layers on and off, is **not** to be used on DSC drawings. The second method, **which is to be used on DSC drawings,** is the multiple file approach. This allows a drawing to be created by using reference files (xrefs). This method allows for a total team approach and easier file sharing.

Drawings that are to be used as external reference drawings, or base sheets, should be saved to the "bases" directory, to be available to all users needing a base drawing for their specific discipline. Base drawings should contain only the necessary information needed for use by other disciplines, but not the information specific to the original discipline. This way base drawings can be utilized immediately, without the need to analyze and manipulate.

Any base drawing to be used as an xref shall have all objects created **color by layer** only. This allows for easier pen weight modification, when necessary.

Layer Formats

The layering formats are organized as a hierarchy. This structure makes the list easier to use and accommodates future expansion. Layer names are alphanumeric and use easy-to-remember abbreviations such as A-DOOR for architectural doors, A-WALL for architectural walls, and C-TOPO for proposed contour lines and elevations.

Layer names shall be limited to 18 characters. Abbreviations for minor group, modifier and user defined fields should be 4 characters. Hyphens are used to separate major group, minor group, and modifier to improve readability.

Major Groups

Major groups correspond to the traditional discipline designations used in construction document sheet numbering.

Major Group Designations:	G	General
	C	Civil
	L	Landscape Architecture
	A	Architecture
	S	Structural
	M	Mechanical (HVAC)
	P	Plumbing
	F	Fire Protection
	E	Electrical

Minor Groups

Minor groups subdivide major groups. For example, the architectural major group contains minor groups for walls, doors, floors, ceilings, equipment, etc.

Modifier

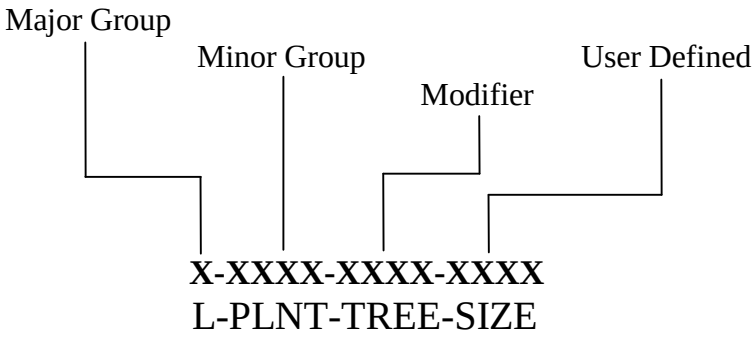
A modifier may be added to a layer name for further differentiation. For example, walls (A-WALL) may be categorized as full height (A-WALL-FULL).

The modifier is optional and need not be used when the minor group layer name alone will suffice. The choice of using layer names with or without modifiers allows the standards to be used in a straightforward, streamlined fashion for simple projects that don't need the level of detail required for large complicated projects.

User Definable Fields

The user-defined field allows additional layers to be added to accommodate special project requirements. The user-defined field may be added after a modifier or in place of a modifier.

Example



Drawing Templates

There are standard template drawings (.dwt) available for use on DSC drawings. Each template has a master list of layers for the specific discipline. Layers can be added or purged as needed. These templates can be found on the file server in the s:\proto folder.

The drawing templates are:

arch.dwt	Architectural drawings
civldetl.dwt	Civil drawings - detail sheets (inches)
civlsite.dwt	Civil drawings - plans (decimal,feet)
covbase.dwt	Cover sheet - base drawing
covproj.dwt	Cover sheet - project specific information
elec.dwt	Electrical drawings
elecaux.dwt	Electrical drawings (Auxiliary systems)
fire.dwt	Fire Protection drawings
ladetl.dwt	Landscape architecture drawings - detail sheets (inches)
lasite.dwt	Landscape architecture drawings - plans (decimal, feet)
mech.dwt	Mechanical (HVAC) drawings
plumb.dwt	Plumbing drawings
struct.dwt	Structural drawings

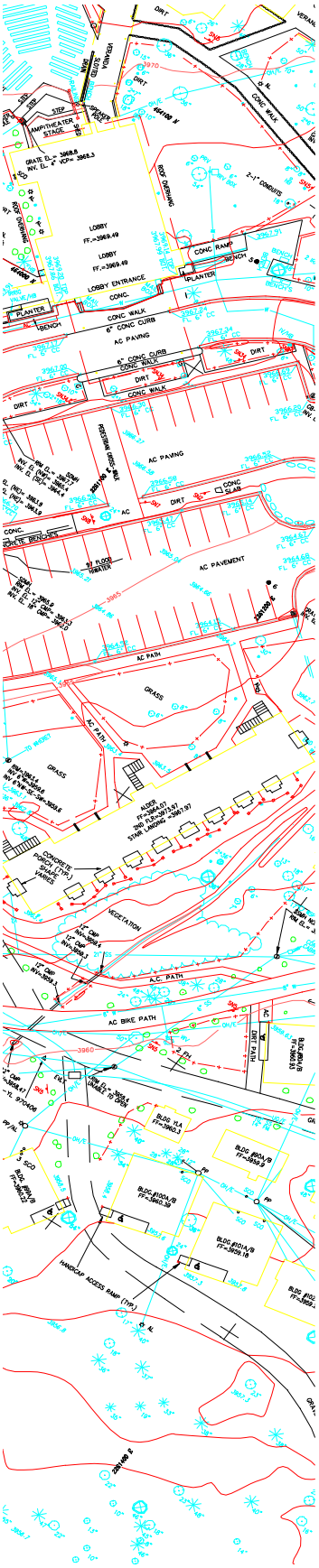
The layers in these drawing templates have been created with color number and linetype. Color number (pen weights) can and should change relative to the scale of the drawing. See Appendix A for DSC standard template drawing layer lists.

Common Layers

There are six common layers preset in these templates. They are:

Z-BRDR	- for the standard sheet border
Z-BRDR-CHECK	- for "check print" across the title block
Z-CONST	- for construction lines
Z-NOPLOT	- for no plot graphics or notes
Z-README	- for user information (no plot)
Z-SYMS-GENR	- for general symbols specific to the sheet (north arrow, scales, etc.)

These layers are prefixed with a "Z", in an effort to keep the layers organized, with the "Z-" layers always listed last in the layer list.



Chapter 3

Drawing Format

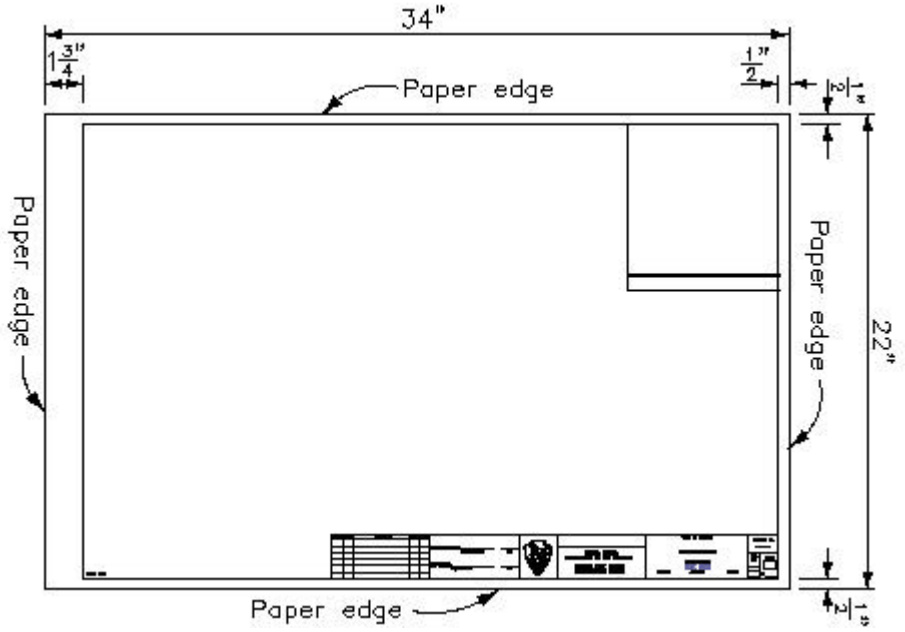
Drawing Format

Standard Sheets

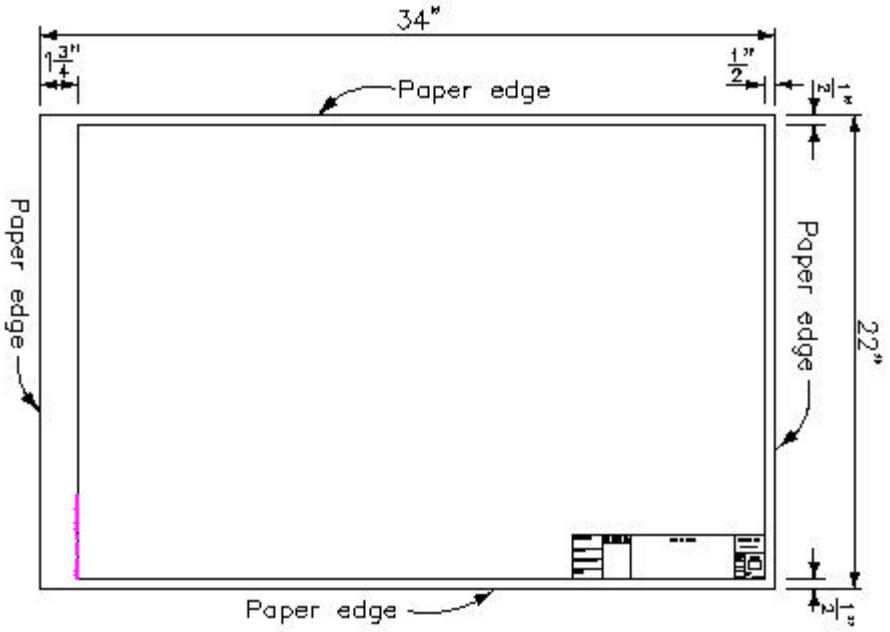
Standard 22"x34" NPS drawings sheets are used for design, construction and as-constructed drawings. See Figure 3-1 for our standard cover sheet border, which also shows the location of approval and revision blocks, when required. See Figure 3-2 for the standard 2nd sheet border.

Standard sheets include:

- **Cover Sheet** - Standard cover sheet with vicinity, park map and project index.
- **Second Sheet** - Standard border sheet.
- **Plan and Profile Sheets** - These are standard second sheet borders, with grids for a plan and profile sheet and a full profile sheet.



Standard Cover Sheet Border
Figure 3-1



Standard Second Sheet Border
Figure 3-2

Title Blocks

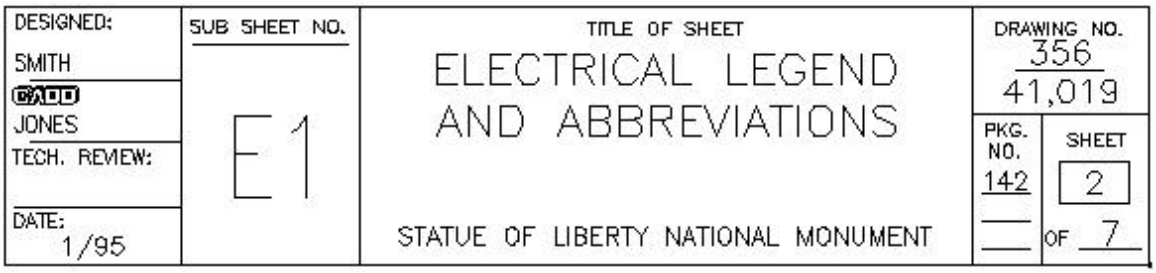
The title block on a cover sheet includes the project title, specific location within the park, park name, region, county and state, as shown in Figure 3-3.

Title blocks on second sheets contain the title of the sheet and the park name. In some cases, the location within the park is necessary. See Figure 3-4.

Every title block will also include a drawing number, a package number and sheet numbering. Each second sheet title block will also include a subsheet number.

CONSTRUCTION DRAWINGS UNITED STATES DEPARTMENT OF THE INTERIOR NATIONAL PARK SERVICE DENVER SERVICE CENTER	TITLE OF DRAWING WATER STORAGE SYSTEM LOCATION WITHIN PARK LIBERTY ISLAND NAME OF PARK STATUE OF LIBERTY NATIONAL MONUMENT REGION N. ATLANTIC / COUNTY KINGS / STATE NEW YORK	DRAWING NO. 356 41,019 PKG. NO. 142 SHEET 1 OF 7

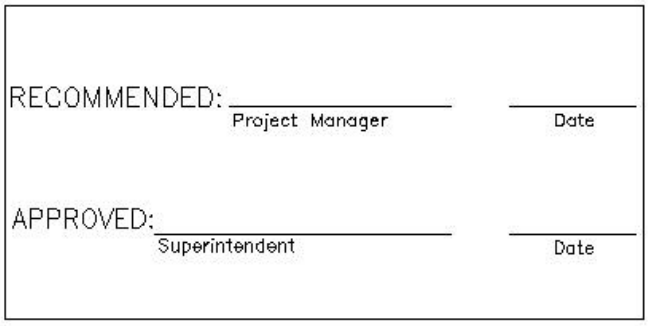
Cover Sheet Title Block
Figure 3-3



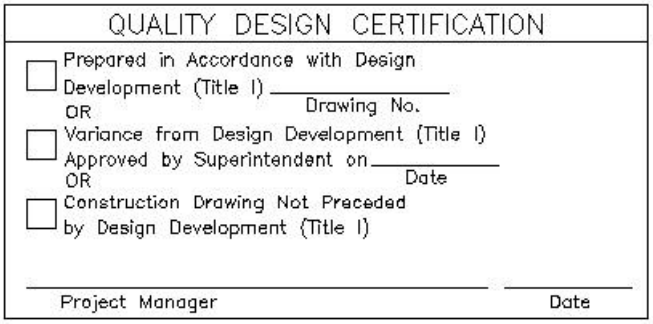
Second Sheet Title Block
Figure 3-4

Approval and Revision Blocks

Approval Block - An approval block is to be placed on the cover sheet of all design and construction drawing sets. See Figure 3-5 for the approval block to be used on the cover sheet of all design development (16DD) drawing sets. Figure 3-6 shows the approval block to be used on the cover sheet of all construction (16CD) drawing sets.



Approval Block (16DD)
Figure 3-5



Approval Block (16CD)
Figure 3-6

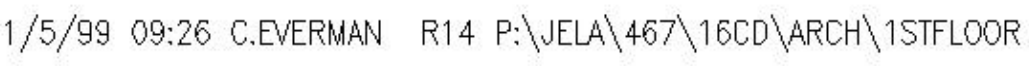
Revision Block - A revision block is required when changes are made to construction drawings, which have been issued for bid and therefore are official contract documents. See Figure 3-7 for a sample of a completed revision block.

Mark	Sheet	REVISION	Date	Initial

Revision Block
Figure 3-7

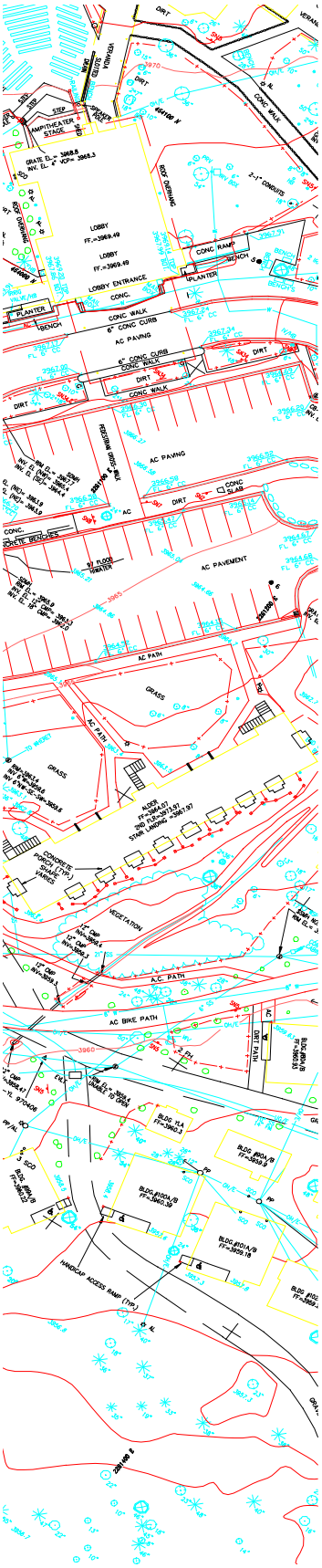
Date Stamp

Each drawing needs to contain a date stamp that includes the AutoCAD release number, the drawing pathname, the filename (including any external references), and the latest date the file was worked on. It is to be located vertically, on the left side of the border sheet, outside the border. This date stamp is written into the customization of our border sheet drawings and when using our 2nd sheet borders, the date stamp will automatically be updated each time the drawing is saved. To insert this date stamp on existing drawings, you can access the "auto stamp" icon from the icon menu. Figure 3-8 below shows a sample of the date stamp.



Date Stamp
Figure 3-8

All of the standard border sheets, with title block attributes, and the approval and revision blocks are available through the DSC support folder, and easily accessed from the DSC Icon Menu (see Chapter 4, Symbols). The DSC customization files are included with the DSC CADD Standards documentation, or can be requested from the A/E Managers. If more specific information is needed regarding the necessary drafting standards, see NPS-10 Rel.3.



Chapter 4

Drafting Practices

Drafting Practices

All NPS drawings are microfilmed and construction drawings are issued to prospective bidders as nominal half size prints. All drawings must be capable of being reproduced as clear and legible half-size prints. Line quality and adequate lettering size are essential to meet these requirements. By following the recommended line weights and the DSC Standard Pen/Color Configuration (Figure 4-2), all drawing files will be able to be reproduced as clear and legible half size drawings.

Line Weights

Any new work should be easily distinguishable from other information shown on the drawings. Show new work at 100% (unscreened) and show existing conditions, including text, screened at 50%. Background information shown for orientation or clarification may be screened at 50%.

Varying line widths on drawings substantially improve their readability. The line widths shown in Figure 4-1 have been established as the standard line widths for DSC CADD drawings. No line weight should be less than .013" in thickness.

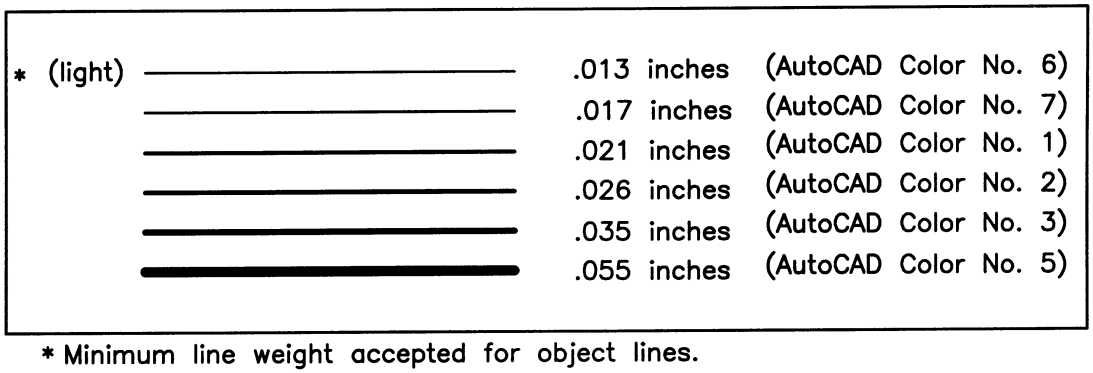


Figure 4-1

Pen Colors

Colors relate to pen weights (line widths) that are mapped to the plotters. All drawings will be generated using the DSC Pen/Color Configuration. (See Figure 4-2.)

The Oce plotters are currently set to plot 9 different pen widths. The Pen/Color Configuration chart shows the color numbers that represent each specific line width, as mapped to the plotters. We have mapped the colors for plotting 100% density, 50% density (screened), and 30% density (screened). The 30% screened pattern is not recommended for use, other than poche, symboling or hatching. If used, please note that it may or may not reproduce clearly or legibly, and portions could be lost.

Masked Colors - High Priority/Low Priority Color Numbers
(DSC Specific)

As shown in Figure 4-2, colors 1 through 128 are low priority pen colors. Colors 129 through 240 are high priority pen colors. High and low priority pen colors work with the 'Mask' command at DSC. The 'Mask' command creates a solid entity in a no-plot pen, that when plotted, hides the lines underneath. Using high priority pens allows you to place graphics or text in the masked areas, and allows for these high priority pens to be plotted.

Example for use: Topo lines with text running through it. In order to view the text clearly, the masking (drawn in a no-plot pen) will hide the topo (drawn in a low priority pen), but allow the high priority text to plot. A major benefit to this command is that it allows you to hide topo lines without actually breaking them, and keeping the continuity of the topo intact.

NOTE: You must plot using the CADNET software (installed at DSC) for the mask effect to work.

PEN/COLOR CONFIGURATION

Plotted full size	Rapido	Decimal	%		Color Number Low Priority	Color Number High Priority
	1	.021	100%	Red	1,33,65,97	129,161,193,225
	2	.026	100	Yellow	2,34,66,98	130,162,194,226
	3	.035	100	Green	3,35,67,99	131,163,195,227
	000	.010	100	Cyan	4,36,68,100	132,164,196,228
	5	.055	100	Blue	5,37,69,101	133,165,197,229
	00	.013	100	Magenta	6,38,70,102	134,166,198,230
	0	.017	100	White	7,39,71,103	135,167,199,231
	No plot	–	–	Dk Grey	8,40,72,104	136
	No plot	–	–	Grey	9,41,73,105	137
	0	.017	50		10,42,74,106	138,170,202,234
	1	.021	50		11,43,75,107	139,171,203,235
	2	.026	50		12,44,76,108	140,172,204,236
	3	.035	50		13,45,77,109	141,173,205,237
	000	.010	50		14,46,78,110	142,174,206,238
	5	.055	50		15,47,79,111	143,175,207,239
	00	.013	50		16,48,80,112	144,176,208,240
	No plot	–	–		17,49,81,113	
	No plot	–	–		18,50,82,114	
	No plot	–	–		19,51,83,115	
	0	.017	30		20,52,84,116	
	1	.021	30		21,53,85,117	
	2	.026	30		22,54,86,118	
	3	.035	30		23,55,87,119	
	000	.010	30		24,56,88,120	
	5	.055	30		25,57,89,121	
	00	.013	30		26,58,90,122	
	4	.043	100		27,59,91,123	
	4	.043	50		28,60,92,124	
	4	.043	30		29,61,93,125	
	6	.067	100		30,62,94,126	
	6	.067	50		31,63,95,127	
	6	.067	30		32,64,96,128	

'Mask' Colors

Figure 4-2

Lettering

The following pen and lettering sizes are recommended for full size drawings so that text will be easily readable after drawings are reduced to half-size.

Standard text height is .130 and should be maintained for most drawing annotation. A minimum lettering height of .100 is acceptable, when used for special purposes such as symboling or stacked fractions.

Standard lettering sizes/color numbers:

.130 text height	Color No. 7	(.017 width) -	standard text and dimensioning
.140 text height	Color No. 1	(.021 width) -	sub-titles, headings
.175 text height	Color No. 2	(.026 width) -	plan titles, detail titles, section titles, section or detail callouts, etc.

See Figure 4-2**,** DSC Pen Color/Configuration chart, for color numbers for screened text.

Text Styles

Standard text fonts (styles) to be used on all DSC drawings are the roman simplex (romans.shx), or the architectural (arch.shx). See Figure 4-3 for examples of the lettering styles**.** The romans.shx font provides the maximum readability and transportability of text entities between CADD drawings. The clarity of this font provides the ability to plot readable text at height of 0.1 (DSC minimum) inches. The arch.shx font is not a standard AutoCAD font, but has been approved as an option for architectural style text. It is available to all DSC CADD users through the standard initialization. For users outside of DSC, the arch.shx font is included with a copy of the DSC CADD User's Guide.

Lettering Styles

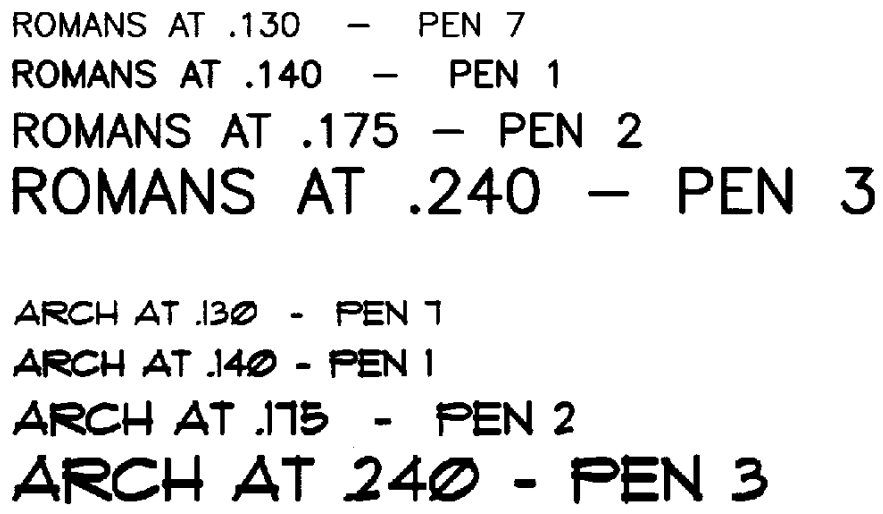


Figure 4-3

TWIZ - An AutoCAD command has been created at DSC called "TWIZ" (Text Wizard) which configures your text styles based on user selected options. The TWIZ command can be entered at the AutoCAD command prompt, selected from the NPS General Toolbar, or selected from the Command Add-ons located in the NPS pull down menu.

Dimensions

DWIZ -Another AutoCAD command, similar to the text wizard, has been created at DSC called "DWIZ" (Dimension Wizard). DWIZ configures your dimension styles based on user selected options. The command can be entered at the AutoCAD command prompt, selected from the NPS General Toolbar, or selected from the Command Add-ons located in the NPS pull down menu.

Standard Details

In continuing with our efforts to keep layers at a minimum, our layering standard for details will incorporate only the necessary layers needed for editing the details easily.

The list below defines the needs that should be met to insure compatibility with DSC AutoCAD drawings.

- All details shall be drawn full size in model space
- Any details that are non-scaleable should be drawn at actual plot size (i.e.: mview 1xp)
- Layering shall be as follows (with c indicating civil - for discipline type)

Layer Name	Description
c-detl-objt	for objects and anything other than annotation and hatching
c-detl-anno	for text and dimensioning
c-detl-htch-bdry	for hatch boundary polylines
c-detl-htch	for hatch patterns
z-noplot	for user information

- architectural detail layers would then start with an a-
- LA detail layers would start with an la-
- electrical detail layers would start with and e-
- etc.

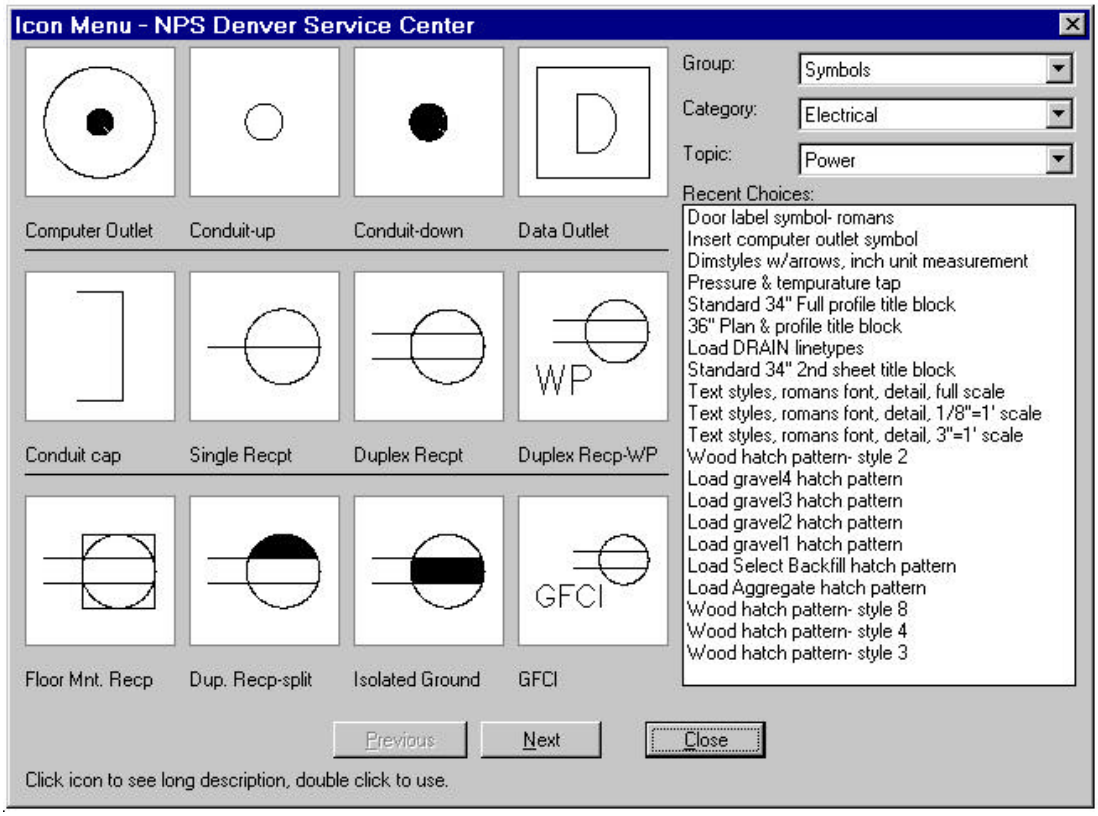
- Dimension style should be associative
- Use standard DSC text styles
- Leaders should be arc style
- Hatch should be associative
- Hatch boundary - use a noplot polyline (on layer detl-htch-bdry) to create boundary for hatch.
- Creator shall use the z-noplot layer for user information such as plot scale, etc. (Place a note below the detail on this z-noplot layer indicating the scale of the annotation, etc.)
- Details should be drawn following standards identified in the NPS-10 guideline to insure compatibility and half-size reproducibility.
- Details should be drawn using the DSC CADD Standard Pen/Color Configuration.

Symbols

Icon Menu

The graphic symbols to be used on NPS design and construction drawings can best be accessed through the icon menus by selecting the icon menu icon from the discipline specific toolbars. The icon menu can also be accessed by typing "IM" at the command prompt and selecting the descriptive group, category and topic (in that order) that the symbol would be found under. When group, category and topic are selected, the icon menu will then display the related symbols.

Below is an example of the symbol icon menu. In this case, the group is "Symbols", the category is "Electrical" and the topic is "Power".

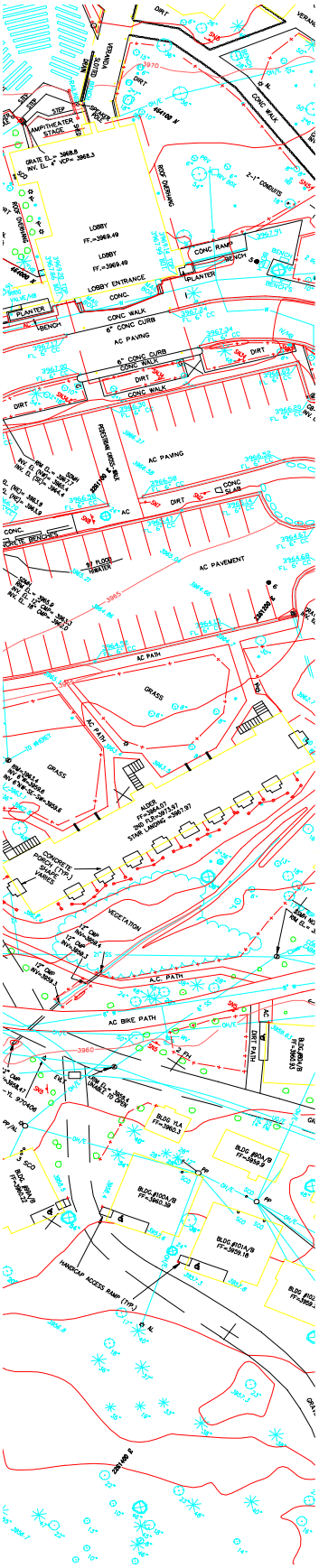


Below each symbol on the icon menu is a short description of the individual symbol. For a more complete description, click on the icon once. A longer description will appear on the lower left corner of the icon menu. To access the symbol for placement on a drawing, double click on the symbol. Once a symbol has been selected, the user will be prompted for placement specifics, such as units,

scale, insertion point, rotation angle and attributes. The prompts will vary depending on the individual symbol and its common use. On the right hand side of the icon menu, there is a "Recent Choices" box. This box will list the symbols that have been most recently accessed. Double clicking on a symbol description in this list can also access symbols.

Some NPS standard symbols produce graphics using a series of commands (lisp routines) based on user input, such as border sheets, section cuts, title and detail callouts and some discipline specific symbols. These are also accessible from the icon menu.

For a complete listing of symbols available from the icon menu, see Appendix E.



Chapter 5

AutoCAD Customization

ðCustomization

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ð This section is designed to give information on AutoCAD customization that has been developed for the DSC. Repetitively used setups, commands and symbols have been customized and made available to users to add additional functionality to the AutoCAD program, specific to the needs of the NPS design and construction program.

Note:
If you're on the DSC network, once your AutoCAD is properly configured, you'll see the NPS pulldown menu in AutoCAD. If you're not on the DSC network, you can install the AutoCAD customization on your PC. This customization is available on CD-ROM (contact your NPS Project Manager) or you can download it from the following WEB site: http://165.83.23.11/dsc/cadd/index.html
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ðThe NPS Pulldown Menu

The NPS pulldown menu, located on the AutoCAD menu bar, contains access to customized commands and toolbars created for DSC use. The NPS pulldown menu offers three options:

- Command Add-ons - A list of custom commands
- Toolbars - Discipline specific toolbars
- Web Links - Direct access to DSC support sites

Command Add-ons

The Command Add-ons menu selection brings up a dialogue box listing all custom commands available to the user and a general description of each commands function. Instructions are contained in the dialogue box, which allow the user to browse the list of commands, select a command for use, or generate a more detailed description of the selected command functionality. See Appendix B for a list of the DSC specific commands.

Toolbars

The Toolbars menu selection brings up a menu, which displays selections for the Main Toolbar, and the discipline specific toolbars that have been developed to meet DSC needs. See Appendix C for DSC Custom Toolbars.

The Main Toolbar

The Main Toolbar brings up a menu that offers a main toolbar with flyouts or individual toolbars that contain the main tools, grouped by function. The Main Toolbar was created to provide easy access to DSC specific functions that benefit all users.

Main/Tools

Icon Menu	- Will take the user directly to the icon menu for selection of symbols
Add-on Commands	- Custom commands developed for DSC use
Open Recent Drawing	- Displays a list of recently opened drawings for user selection
Get Layer	- Displays the layer of user selected object
Get Point Between	- Allows user to find midpoint of 2 selected points while in a command

Main/CADNET Plotting

PRF Generator	- Brings up CADNET's PRF Generator dialogue box for modifying plot parameters
Quick PRF	- Creates .prf files using default parameters
Submit PRF	- Allows user to submit previously created .prf files or groups of files
PRF Configuration	- Allows user to direct prints or plots to selected printer or plotter, using the preset parameters

Main/Object Properties

Layer Set	- Set Current Layer
All Layers On	- Turns on all layers
Layer Off	- Turns off selected layers
Thaw All Layers	- Thaws all layers
Layer Freeze	- Freezes selected layers
Layer Lock	- Locks selected layers
Layer Unlock	- Unlocks selected layers
Set Layer/Color/Ltype	- Sets layer, color and/or linetype to match existing objects
Text Set	- Select text to match attributes

Main/Modify Objects

Change Layer	- Changes the layer of objects
Copy Properties	- Changes properties to match selected objects
Change Text Height	- Changes text height of selected text

Main/Construction Entities

Freestyle Construction Line - Construction line drawn in no-plot pen
X-axis - Draws construction line across x-axis at point specified
Y-axis - Draws construction line across y-axis at point specified
X-Y axis - Draws construction line across x and y axis at point specified
Point - Places a point (node) at user specified location (no plot)
Erase Construction Entities - Erases selected construction entities

Main/View

Birdseye 1 - Transparent zoom (1)
Save Birdseye 1 - Save view of birdseye 1
Birdseye 2 - Transparent zoom (2)
Save Birdseye 2 - Save view of birdseye 2
Birdseye 3 - Transparent zoom (3)
Save Birdseye 3 - Save view of birdseye 3

The General Toolbar

The general toolbar was created to be used by all disciplines on design and construction drawings. It contains the standard drawing sheet symbols for NPS drawings and has been divided into 6 flyouts.

General

Sheet specific symbols
- Insert 2nd sheet - takes user to the icon menu for border sheet selection
- Scale Markers - takes user to a dialogue box for selecting scale options
- North Arrow - standard NPS north arrow

Detail specific symbols
- Section Cuts - standard NPS section cut
- Detail Titles - standard NPS detail titles
- Elevation Target - standard elevation target
- Detail Identification - detail bubble, multiple functions.

Dimension Wizard - imports and sets up dimension style, based on user selections
Text Wizard - imports and sets up text style, based on user selections
Leaders - arc leader lines - 3 pt or 4 pt (single or double arc)
- loop leader lines - 3 pt or 4 pt (single or double arc)

	- 'into' leader lines - 3 pt or 4 pt (single or double arc)
Break lines	- arc break symbol
	- straight line break symbol
	- stacked fractions

The Architectural Toolbar

The architectural toolbar has been created to support the architectural design features.

Architectural

Architectural Plumbing fixtures	- This icon takes users to the icon menu for selection of plumbing fixtures
Architectural Labels	- flyout offers wall, door, room and window labels
Door Swing	- flyout containing one icon for creating door swings, and one icon for batt insulation

The Civil Toolbar

The civil toolbar is divided into four flyouts. The first flyout offers users five categories of symbols specific to civil engineering. The second flyout offers linetypes. The third flyout is for accessing hatch patterns and the fourth flyout (still in the development stage) will be for accessing civil related standard details.

Civil

General civil symbols	- takes user to the icon menu for selection
Drainage symbols	- takes user to the icon menu specific to drainage
Sewer symbols	- takes user to the icon menu specific to sewer
Water symbols	- takes user to the icon menu specific to water
Plumbing symbols	- takes user to the icon menu specific to plumbing
General linetypes	- takes user to the icon menu for general linetypes
Engineering linetypes	- offers civil engineering specific linetypes
Site linetypes	- offers site specific linetypes
General hatch patterns	- takes user to the icon menu for site related hatch patterns

The Electrical Toolbar

The electrical toolbar contains the symbols most often used on electrical drawings. By selecting the electrical engineering menu, a second menu offers the

users a main electrical flyout toolbar containing symbols covering all three areas of electrical drawings or individual toolbars that are specific to the three areas of electrical engineering - power, lighting, and controls.

Electrical/Power

- contains icons for the most often used graphic symbols related to electrical power
- the last icon takes the user to the icon menu for additional symbols

Electrical/Lighting

- contains icons for the most often used graphic symbols related to electrical lighting
- the last icon takes the user to the icon menu for additional symbols

Electrical/Controls

- contains icons for commonly used symbols on control drawings
- the last icon takes the user to the icon menu for additional symbols

The Mechanical Toolbar

The NPS mechanical toolbar contains the symbols most often used on mechanical drawings. By selecting the Mechanical Engineering menu selection, a menu offers the users a main mechanical flyout toolbar or individual toolbars that are specific to the 3 areas of mechanical engineering.

The main mechanical flyout toolbar is a toolbar with three flyouts, each flyout specific to either the HVAC, the plumbing or the fire sprinkler system symbols. The individual toolbars offer the symbols to users on separate toolbars.

Mechanical/HVAC Toolbar

- contains icons for the most often used graphic symbols for HVAC drawings
- the last icon takes the user to the icon menu for additional symbols

Mechanical/Piping Toolbar

- contains icons for the most often used graphic symbols for plumbing/piping drawings
- contains icon for accessing plumbing/piping linetypes - IN CONSTRUCTION
- the last icon takes the user to the icon menu for additional symbols

Mechanical/Fire Sprinkler Toolbar

- Contains icons offering graphic symbols for fire sprinkler system drawings

The Structural Toolbar

The structural toolbar was developed to aid in the design and graphic representation of structural elements throughout the design and construction documents.

Structural

DD Welds	- weld symbol editor dialogue box
W section	- flyout containing steel shapes, AISC shape database
Bolt-Nut	- flyout containing one icon for bolt construction and one icon for nut construction
Gridline	- construction of grid lines and grid bubble (grid mark)
Graph $f_{(x)}$	- This function draws a graph of a mathematical expression that you input using AutoCAD's calculator syntax.

Appendix D offers individual icon descriptions for each icon shown on the DSC Custom Toolbars.

Web Links

The Web Links selection on the NPS pulldown menu offers the user a menu with three avenues for connecting to the Denver Service Center Web sites.

DSC CADD Resources

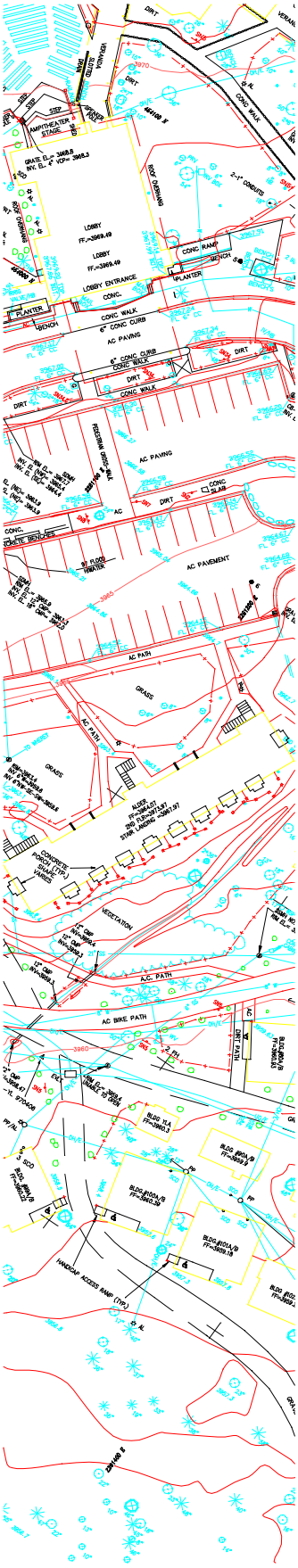
- This menu selection takes the user to the DSC CADD intranet site. This site offers another avenue of support services to AutoCAD users at the Denver Service Center.

DSC CADD Announcements

- This selection links the user to the DSC CADD Announcement page of the DSC CADD intranet site. This page displays up-to-date announcements and a listing of any changes made to our support web site.

Amoeba Project

- This selection takes the user directly to the NPS Amoeba Project. The Amoeba Project is a document and imaging project being conducted by the Denver Service Center, Technical Information Center. The vision for Amoeba is that it will be the central repository/single point of access for NPS wide data stored in Denver.



Chapter 6

Plotting at DSC

Plotting at DSC

There are two plotting options for plotting AutoCAD drawings at the Denver Service Center. Most plotting is done through the NT network, using the CADNET plotting software licensed at DSC. The CADNET software gives us added functionality in plotting drawings and sets of drawings without being in AutoCAD. Plotting can also be done through the NT network, using the AutoCAD print function within the AutoCAD software. This chapter gives a general description of both plotting options, and their use at DSC.

CADNET Plotting Software

The CADNET software controls the pen settings and plot parameters, so there is no need for PCP files. Using CADNET, a Plot Request Form (a PRF file - a small ASCII text file) is generated based on standard default settings or specific user input. Plots can be sent, using PRF files, without being in AutoCAD. The user can send multiple plots, request multiple copies of plots, and plots can be generated in a specific order (collated). The Oce plotter and the HP5Si LaserJet printers can be accessed through the CADNET software.

Plotting/Printing through CADNET

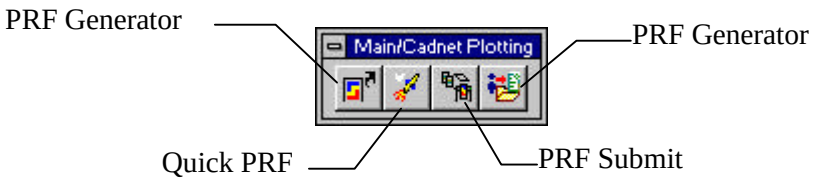
A **PRF** file (Plot Request Form) contains the information the plotter needs to plot the drawing, such as the drawing filename, plotter name, paper size, plot window/extents, rotation, and username. You create a PRF file in AutoCAD using the PRF Generator. Once a PRF file is generated, most changes made and saved in AutoCAD will be plotted using the initial PRF file. There are only a few instances when a new PRF would need to be generated.

You would need to generate a new PRF file if:

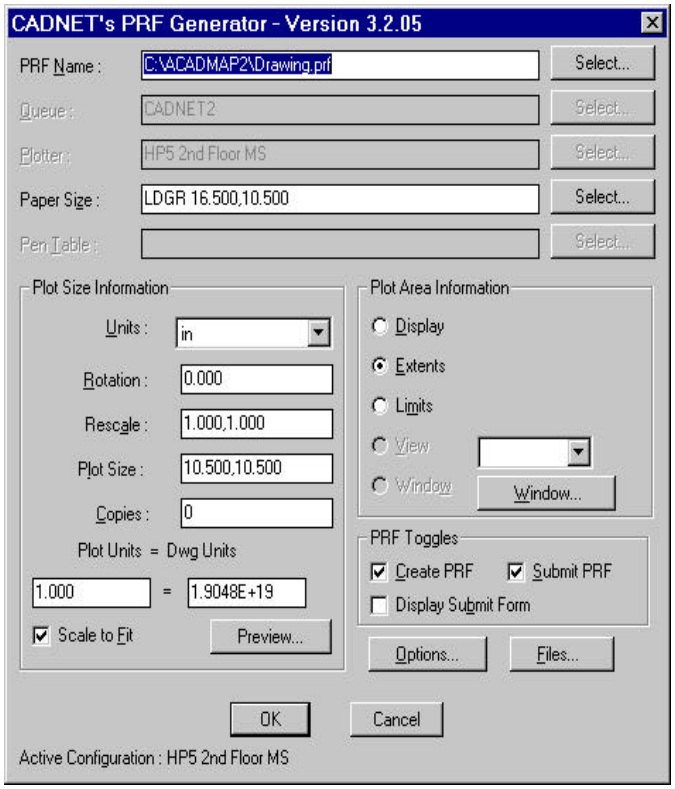
- your layer settings change (turning layers on or off, freezing or thawing layers)
- you change the mview (viewports) in paperspace
- you change any specific plot parameters (plotter, drawing area, paper size, rotation, plot window/extents)

CADNET Toolbar

CADNET plotting options can be accessed from the CADNET toolbar, as shown below.



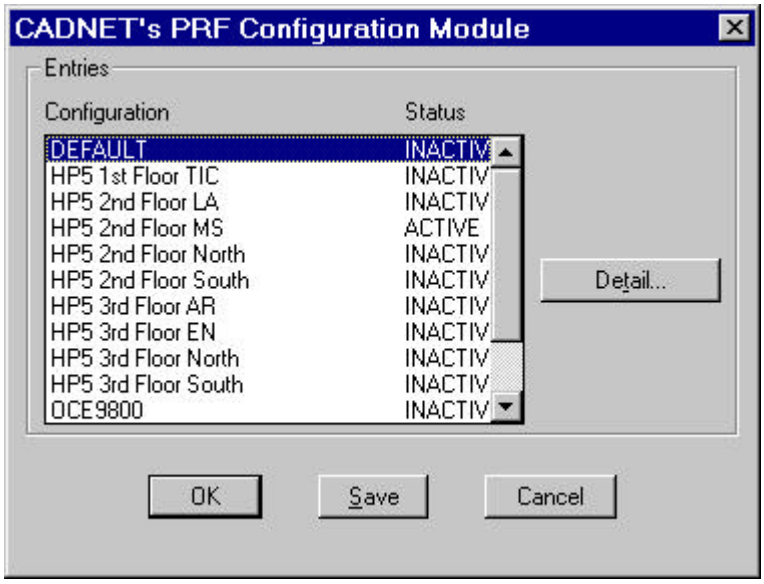
PRF Generator - The PRF Generator brings up a dialogue box for modifying plot parameters such as the PRF file name, the plotter, paper size, plot rotation, number of copies, and plot size and area information.



The PRF Generator also has an 'options' selection, allowing the user to input accounting information such as username, project, and account numbers.

Quick PRF - The Quick PRF plotting option creates a PRF file, and submits the PRF for plotting, using standard default parameters. The Quick PRF option is dependent on the plotter selection made from the PRF Configuration module. When selected, your PRF file will be generated based on the latest saved file, and sent to the plotter or printer identified in the PRF Configuration Module.

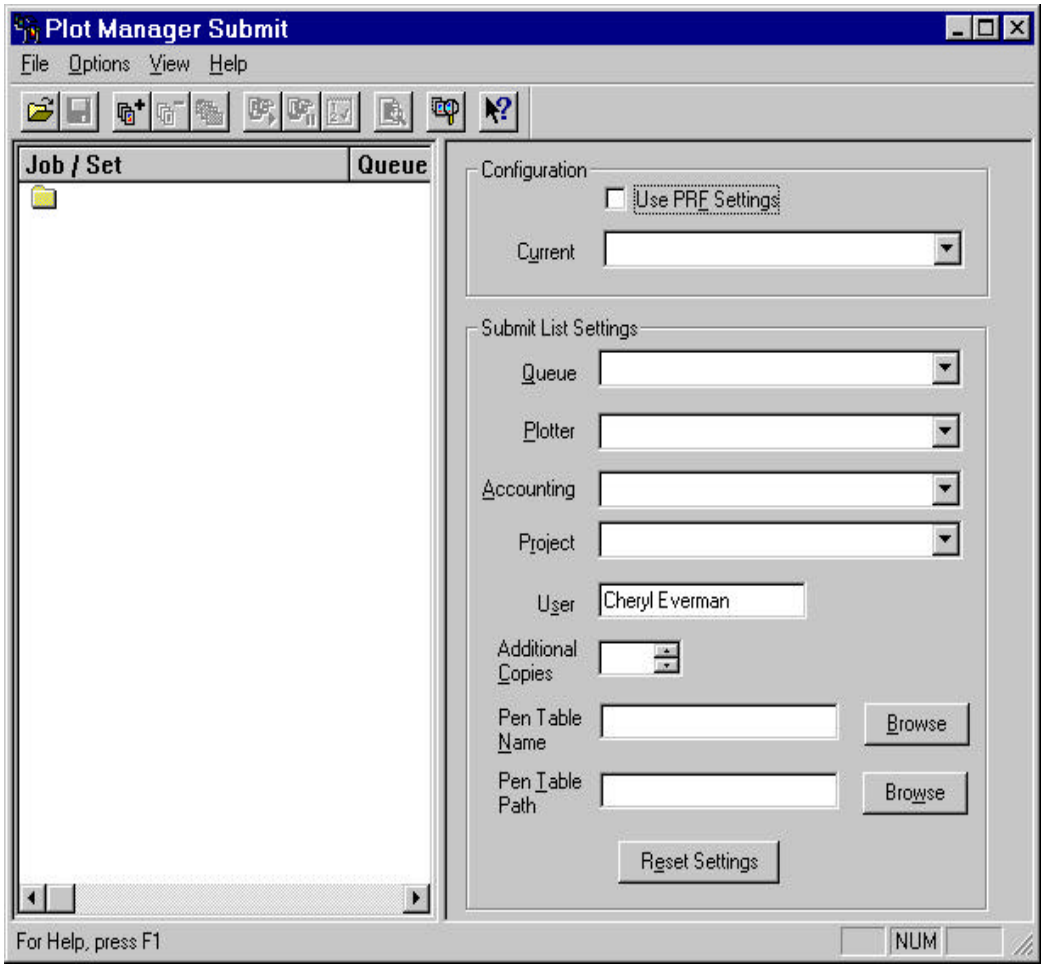
PRF Configuration - CADNET's PRF Configuration Module allows the user to select the plotter or printer they need to send to. The configurations for these plotters and printers have been set up based on the most commonly used plot parameters.



PRF Submit Form – The PRF Submit Form accessed from the CADNET toolbar allows the user to submit previously created PRF files without opening the AutoCAD drawing. We have experienced at DSC, that the Windows NT Plot Manager Submit function, shown on page 6-4, better meets our needs for sending existing PRF files outside of AutoCAD.

Plot Manager Submit

Through Windows NT you can use Plot Manager Submit to send your plot or groups of plots to the plotter without being in AutoCAD. Here, you can collate your set of drawings, change plotters or number of copies and send them to plot using previously created PRF files.



AutoCAD Print

Plotting and printing can also be done through AutoCAD using the print function within the AutoCAD software. When plotting through AutoCAD, the software controls the final output through the use of PCP (partial plot configuration) files. The PCP files identify pen assignments, plot area, scale, paper size and rotation. PCP files have been created for the plotters at DSC when using the AutoCAD print function.

PCP Files

Drawings will not plot the proper pen widths, colors, or units unless the appropriate partial plotter configuration (PCP) file has been applied to the plot. PCP files have been created for use at DSC for the Oce plotter, the HP5Si LaserJet printer, and the HP650 and HP750 DesignJet plotters**.**

The following PCP files are located in the s:\support folder at DSC or in C:\ACAD\SUPPORT\ if your customization is installed on your standalone PC.

hp5full.pcp - HP5Si LaserJet - half size prints (11"x17")
no pen width reduction for reduced size
hp5half.pcp - HP5Si LaserJet – half size prints (11"x17")
pen widths will plot at a half-size reduction
Oce.pcp - Oce plotter - full size (22"x34") plots
Ocehalf.pcp - Oce plotter - half size (11"x17") plots
pen widths will plot at a half-size reduction

650-750color.pcp - HP650/HP750 DesignJet plotters - full size color plots)
650-750grayscale.pcp - HP650/HP750 DesignJet plotters - full size plots (with screening capabilities)
650-750grayscalehalfsize.pcp - HP650/HP750 DesignJet - half size plots, pens will plot at half size reduction

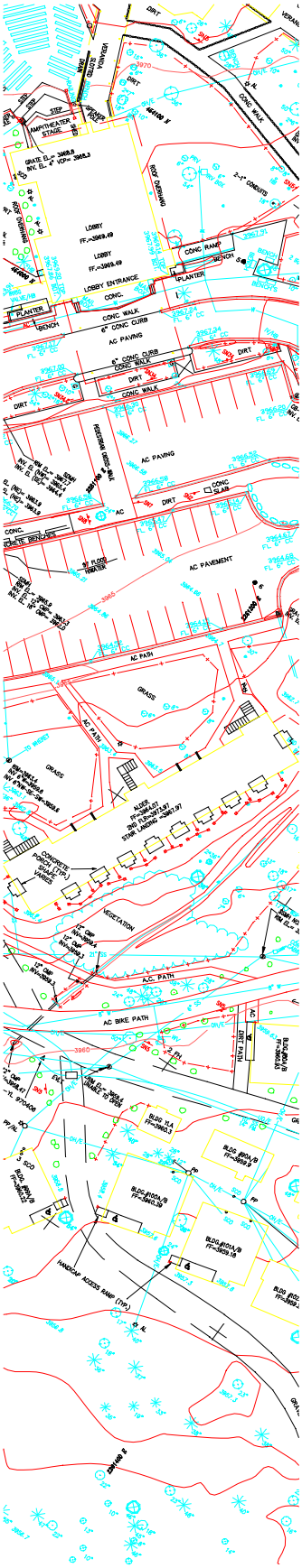
Plotters and Printers

The LaserJet HP5Si printers are located on each floor at the Denver Service Center. They can print up to 11" x 17" (half-size), they can print our screened pens, and can print pen widths at full or half size reduction, depending on the active CADNET configuration, or the PCP file selected at the time the print is sent.

The Oce plotter is a high-speed monochrome plotter that can plot drawings at full size or half size. The Oce plotter is located in Micrographics and can be utilized through both the CADNET plotting software and the AutoCAD print function.

It is important to note that the plots from the Oce plotter are archival quality and should be used for any final drawing or set of drawings. The HP5Si half size prints should be used for check prints and review sets, but are not considered archival quality.

The HP650 and HP750 DesignJet plotters are used for special circumstances or for backup purposes, and are located on the second floor of the Denver Service Center. The HP DesignJet plotters are accessible through the AutoCAD print function.



Chapter 7

CADD Project Folders

CADD Project Folders

AutoCAD Project Folders on the NT Network

The CADD file server, intended for the storage and file sharing of active project drawings, is located and maintained in the Administrative Program Center. The CADD file server has approximately 50 GB of storage available for CADD drawings.

All AutoCAD drawing files should be stored on the CADD file server for ease of use, file sharing, and to ensure proper backup procedures can be done, as local hard drives are not backed up.

All project folders are available to AutoCAD users through the **P:** drive. Folder structures shown in Chapter 2 should be followed by all users for storing and retrieving files. Only AutoCAD drawing files and related graphic files should be stored on the P: drive.

Another drive accessible to CADD users is the **S:** drive, which stores all support files, including standard symbols, details, and template drawings, and any customization done to aid the user in creating drawings.

These files can be accessed through the s: drive, stored under discipline specific folders. There is also a 'user' folder located under each of these folders, that allows users to store files they have created and use repetitively, prior to being identified as "standard"**.**

The standard folders on the s: drive are set up as follows:

s:\proto	Template drawings (.dwt)
s:\std	Standard details
s:\support	Customization, production tools, plot configuration parameters
s:\sym	Symbol directories

Below each of the above folders, except support, you will find discipline specific folders (arch, mech, elec, civil, LA, struc, gen) for users to more specifically store and locate drawing files.

Again, local hard drives are not backed up. It is the responsibility of each user to store drawings on the file server, so backups can be made, and so files can be shared between project members.

Backup Services

Information Management, Administrative Program Center, is responsible for backups on all files stored on the network file servers.

There are two types of system backups used at DSC - differential and full.

Differential Backups - Differential backups are performed each workday and saves any file that has been changed since the previous full backup.

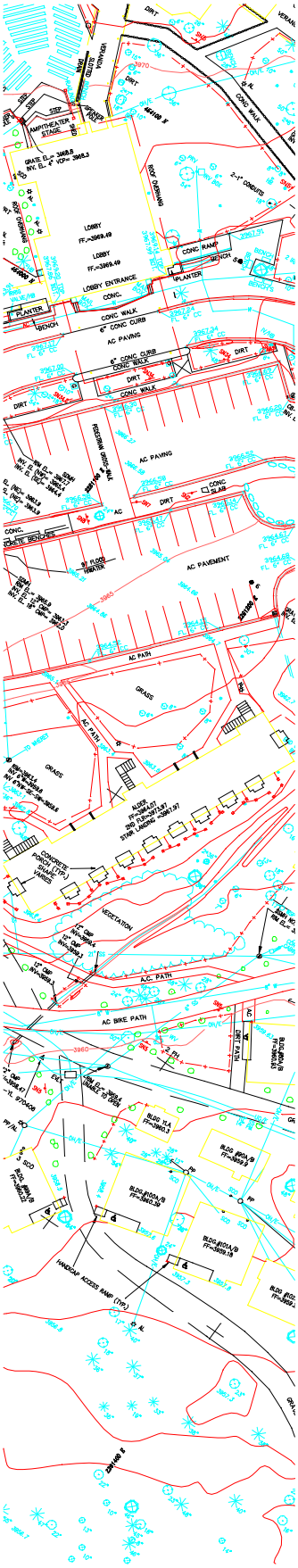
Full System Backups - Full system backups are performed once a week and records everything currently on the server.

Backup schedule

Tuesday (evening)	Full backup of all NT servers
Wednesday-Monday (evenings)	Differential backup of all NT servers

Restore Procedures

When files have been lost or corrupted, they can be restored from the latest backup. File restore requests should be via cc:mail to APC NAT. They will restore the original file to the original location. It is the user's responsibility to rename any file with the same filename prior to their restore request. Any file with the same name in the folder they are restoring to will be overwritten.



Chapter 8

Deliverables and Data Exchange

Deliverables and Data Exchange

General

The need to exchange electronic drawing files between the Denver Service Center and the A/E community as well as the need to maintain consistency necessary for archival and retrieval of electronic drawings necessitates certain requirements that must be met on all projects. The following information can be used as a checklist of pertinent items before submitting work for approval.

Delivery Media

Acceptable media, in preference order is:

a.) CD-ROM
- preferred format, as it is also our archiving media. DSC folder structure is to be maintained.

b.) Iomega ZIP Disks. DSC folder structure is to be maintained.

c.) 3-1/2" high density floppy disks.
- Any disks need to be checked for complete information prior to submitting, to insure all electronic data is accessible.
- A/E's shall retain copies of all electronic data for a period of 90 days as a precautionary measure.
- 3-1/2" disks may contain compressed or "zipped" files only if they are self-extracting in nature.

When exchanging electronic media, an external label should contain, at a minimum, the following information:

a.) Format and version (e.g., Microsoft NT 4.0) of the operating system on which the media was created.

b.) The sequence number in the following format:

Disk **N** of **T**
where **N** = disk sequence number
and **T** = the total number of disks.

c.) The project description.

In addition, a transmittal sheet should accompany the media containing, at a minimum, the following information:

a.) The same information included on the external label of each tape, diskette, etc., and the file names and descriptions for each file.
b.) Any special instructions for restoring/transferring the files from the media.
c.) Certification that the delivery media is free of known computer viruses, including the name(s) and release date(s) of the virus scanning software used to check the media.

Format

All files should be directly readable by AutoCAD Release 14 without conversion. Before a file is placed on the delivery media the following steps should be performed:

a.) Remove all extraneous graphics and drawing entities existing outside the drawing border.
b.) Zoom the drawing to the extents of the drawing area.
c.) Ensure that the only font type used in the drawing is ROMANS.shx or Arch.shx
d.) Ensure that the pens are mapped to the DSC Pen/Color configuration.
e.) Ensure that the folder structure and file naming conventions comply with the DSC requirements.
f.) Pathnames for the electronic file (including external references) must be legible outside the left hand border.
g.) Ensure that the drawing can be plotted using the extents plot routine, without the need for additional manipulation. This includes maintaining the layer state used in all submitted plots. Consequently, there should be a separate drawing file for every plotted sheet submitted for the project.

Hard Copy

Pre-Design/Site Analysis Phase - One reproducible paper copy of drawings are to be provided for archival of this phase (10).

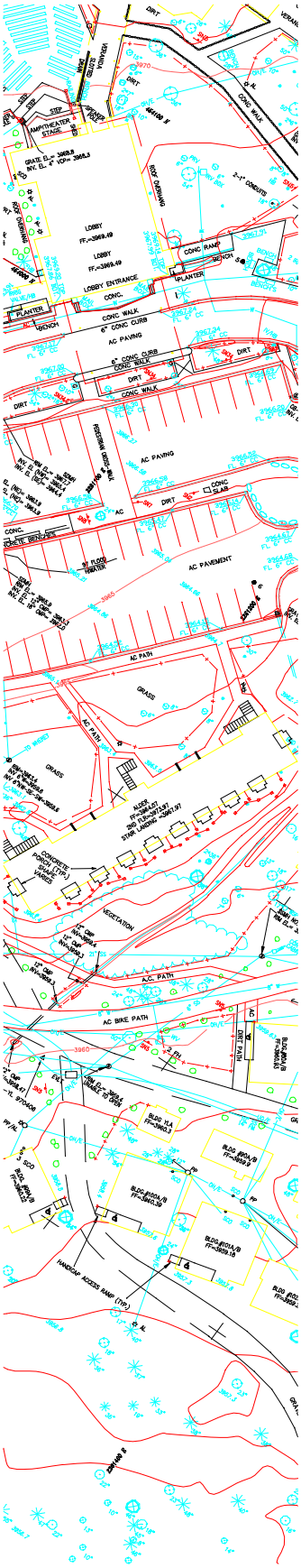
Design Phase - One full size (22"x34") reproducible mylar hard copy is to be provided for each finished drawing in the design phase (16).

As-Constructed Phase - One full size (22"x34") reproducible mylar hard copy is to be provided for each finished drawing in the as-constructed phase (26).

Information Sheet for Transmitting Electric Drawing Files to the DSC, Technical Information Center

Name of Park
Park Code
Drawing Number
Package Number
Project Type (Phase)
Title of Drawing Set
Date
DSC Project Manager/Job Captain
A/E Contact Information
AutoCAD Version Number
3rd Party Software Name and Version Number
Operating System and Version Number
Any Special Instructions:

Attach a list of drawing filenames and a description of each. This should include the Sub-Sheet No., the Sheet No., the Title of Sheet, pathnames and associated xrefs.



Appendix A

DSC Template Drawings

Appendix A
DSC Template Drawings

Architectural

Layer List for S:\PROTO\Arch.dwt

Layer Name	Linetype	Description
A-CLNG-GRID	CONTINUOUS	Ceiling grid
A-COLS	CONTINUOUS	Columns
A-COLS-BUBB	CONTINUOUS	Column bubble
A-COLS-GRID	CENTER	Column grid
A-DETL	CONTINUOUS	Details
A-DETL-ANNO	CONTINUOUS	Detail text and dimensioning
A-DETL-HTCH	CONTINUOUS	Detail hatch patterns
A-DETL-HTCH-BDRY	CONTINUOUS	Detail hatch boundary polylines
A-DETL-OBJT	CONTINUOUS	Detail objects
A-DIMS	CONTINUOUS	Dimensions
A-DOOR	CONTINUOUS	Doors
A-DOOR-JAMB	CONTINUOUS	Door jambs
A-ELEV	CONTINUOUS	Elevations
A-FURN	CONTINUOUS	Furniture
A-GLAZ	CONTINUOUS	Windows, window walls, curtain walls, glazed partitions
A-HTCH	CONTINUOUS	Hatching
A-PLUM-FIXT	CONTINUOUS	Plumbing fixtures
A-ROOF	CONTINUOUS	Roof
A-SECT	CONTINUOUS	Sections
A-SYMS	CONTINUOUS	Symbols
A-SYMS-LABL	CONTINUOUS	Labels: door, window, wall, etc.
A-TEXT	CONTINUOUS	Text
A-WALL	CONTINUOUS	Walls
A-WIND	CONTINUOUS	Windows
Z-BRDR	CONTINUOUS	Standard second sheet border
Z-BRDR-CHECK	CONTINUOUS	Check print across title block
Z-CONST	CONTINUOUS	Construction lines (no plot)
Z-NOPLOT	CONTINUOUS	No plot
Z-README	CONTINUOUS	Operator information for the drawing
Z-SYMS-GENR	CONTINUOUS	General sheet info: scales, north arrow, title bubbles, etc.

Civil Details

Layer List for S:\PROTO\Civldetl.dwt

Layer Name	Linetype	Description
C-DETL	CONTINUOUS	Details
C-DETL-ANNO	CONTINUOUS	Detail text and dimensioning
C-DETL-HTCH	CONTINUOUS	Detail hatch patterns
C-DETL-HTCH-BDRY	CONTINUOUS	Detail hatch boundary polylines
C-DETL-OBJT	CONTINUOUS	Detail objects
C-DIMS	CONTINUOUS	Dimensions
C-ELEV	CONTINUOUS	Elevations
C-HTCH	CONTINUOUS	Hatching
C-SECT	CONTINUOUS	Sections
C-TEXT	CONTINUOUS	Text
Z-BRDR	CONTINUOUS	Standard 2nd sheet border
Z-BRDR-CHECK	CONTINUOUS	Check print across title block
Z-CONST	CONTINUOUS	Construction lines (no plot)
Z-NOPLOT	CONTINUOUS	No plot
Z-README	CONTINUOUS	Operator information for the drawing
Z-SYMS-GENR	CONTINUOUS	General sheet info: scales, north arrow, title bubbles, etc.

Civil Site

Layer List for S:\PROTO\Civlsite.dwt

Layer Name	Linetype	Description
C-BLDG	CONTINUOUS	Building footprints
C-BLDG-EXST	CONTINUOUS	Existing building footprints
C-DETL	CONTINUOUS	Details
C-DETL-ANNO	CONTINUOUS	Detail text and dimensioning
C-DETL-HTCH	CONTINUOUS	Detail hatch patterns
C-DETL-HTCH-BDRY	CONTINUOUS	Detail hatch boundary polylines
C-DETL-OBJT	CONTINUOUS	Detail objects
C-DIMS	CONTINUOUS	Dimensions
C-ELEV	CONTINUOUS	Elevations
C-HTCH	CONTINUOUS	Hatching
C-PKNG	CONTINUOUS	Parking lots
C-PKNG-EXST	CONTINUOUS	Existing parking
C-ROAD	CONTINUOUS	Roads
C-ROAD-EXST	CONTINUOUS	Existing roads
C-SECT	CONTINUOUS	Sections
C-SSWR	SAN_SEWER	Sanitary sewer (manholes, pumping stations)
C-SSWR-EXST	SAN_SEWER	Existing sanitary sewer
C-STRM	STM_SEWER	Storm drainage
C-STRM-EXST	STM_SEWER	Existing storm drainage
C-SYMS	CONTINUOUS	Symbols
C-TEXT	CONTINUOUS	Text
C-TOPO	CONTINUOUS	Index contour lines and elevations
C-TOPO-EXST	CONTINUOUS	Existing index contour lines and elevations
C-TOPO-INTR	CONTINUOUS	Intermediate contour lines
C-TOPO-INTR-EXST	CONTINUOUS	Existing intermediate contour lines
C-WATR	WATER	Domestic water (manholes, pumping stations, storage tanks)
C-WATR-EXST	WATER	Existing domestic water
Z-BRDR	CONTINUOUS	Standard 2nd sheet border
Z-BRDR-CHECK	CONTINUOUS	Check print across title block
Z-CONST	CONTINUOUS	Construction lines (no plot)
Z-NOPLOT	CONTINUOUS	No plot
Z-README	CONTINUOUS	Operator information for the drawing
Z-SYMS-GENR	CONTINUOUS	General sheet info: scales, north arrow, title bubbles, etc.

Cover Sheet
Base Information

Layer List for S:\PROTO\Covbase.dwt

Layer Name	Linetype	Description
G-BLDG-EXST	CONTINUOUS	Existing buildings and structures
G-BLDG-TEXT	CONTINUOUS	Building,structure text
G-CITY-BDRY	CONTINUOUS	City boundary lines
G-CITY-TEXT	CONTINUOUS	Text for city boundaries
G-CNTY-LINE	CENTERX2	County boundary lines
G-CNTY-TEXT	CONTINUOUS	Text for county boundaries
G-DIMS	CONTINUOUS	Dimensions
G-FENC	FENCELINE1	Fences
G-FENC-TEXT	CONTINUOUS	Fences - text
G-GEOG	CONTINUOUS	Geographic features - mountains, canyons, etc.
G-GEOG-TEXT	CONTINUOUS	Text associated with geographic features
G-HTCH	CONTINUOUS	Hatching
G-HTCH-BDRY	CONTINUOUS	Hatch boundary polylines
G-MAJR-ROAD	CONTINUOUS	Major roads
G-MAJR-ROAD-TEXT	CONTINUOUS	Major roads - text
G-MINR-ROAD	CONTINUOUS	Minor roads
G-MINR-ROAD-TEXT	CONTINUOUS	Minor roads - text
G-PARK-BDRY	CENTER	Park boundaries
G-PARK-NAME	CONTINUOUS	Park name
G-RAIL	TRACKS	Railroad
G-RAIL-TEXT	CONTINUOUS	Railroad text
G-RIVR	RIVER1	River
G-RIVR-TEXT	CONTINUOUS	River - text
G-STAT-LINE	PHANTOM2	State line
G-STAT-TEXT	CONTINUOUS	State line - text
G-SYMS	CONTINUOUS	Symbols
G-SYMS-TEXT	CONTINUOUS	Symbols - text
G-TRAL	HIDDENX2	Trails
G-TRAL-TEXT	CONTINUOUS	Trails - text
G-TREE-LINE	CLOUD2	Tree lines
G-TREE-TEXT	CONTINUOUS	Trees - text
Z-BRDR	CONTINUOUS	Standard 2nd sheet border
Z-BRDR-CHECK	CONTINUOUS	Check print across title block
Z-CONST	CONTINUOUS	Construction lines (no plot)
Z-NOPLOT	CONTINUOUS	No plot
Z-README	CONTINUOUS	Operator information for the drawing
Z-SYMS-GENR	CONTINUOUS	General sheet info: scales, north arrow, title bubbles, etc.

Cover Sheet
Project Specific Information

Layer List for S:\PROTO\Covproj.dwt

Layer Name	Linetype	Description
G-INDX-HEAD	CONTINUOUS	Index header
G-INDX-TEXT	CONTINUOUS	Index text
G-PROJ-AROW	CONTINUOUS	Project arrow - locates specific project location
G-PROJ-BASE	CONTINUOUS	Existing site map - converted file (no layers)
G-NOTE	CONTINUOUS	Notes
G-SYMS	CONTINUOUS	Symbols
G-SYMS-LGND	CONTINUOUS	Map symbols and legend
Z-BRDR	CONTINUOUS	Cover Sheet border
Z-BRDR-CHECK	CONTINUOUS	Check print across title block
Z-CONST	CONTINUOUS	Construction lines (no plot)
Z-NOPLOT	CONTINUOUS	No plot
Z-README	CONTINUOUS	Operator information for the drawing
Z-SYMS-GENR	CONTINUOUS	General sheet info: scales, north arrow, title bubbles, etc.

Electrical

Layer List for S:\PROTO\Elec.dwt

Layer Name	Linetype	Description
E-DETL	CONTINUOUS	Details
E-DETL-ANNO	CONTINUOUS	Detail text and dimensioning
E-DETL-HTCH	CONTINUOUS	Detail hatch patterns
E-DETL-HTCH-BDRY	CONTINUOUS	Detail hatch boundary polylines
E-DETL-OBJT	CONTINUOUS	Detail objects
E-DIMS	CONTINUOUS	Dimensions
E-ELEV	CONTINUOUS	Elevations
E-HTCH	CONTINUOUS	Hatching
E-LITE	CONTINUOUS	Lighting
E-LITE-CIRC	CONTINUOUS	Lighting circuits
E-LITE-SITE	CONTINUOUS	Site lighting
E-POWR	CONTINUOUS	Power
E-POWR-CIRC	CONTINUOUS	Power circuits
E-POWR-EQPM	CONTINUOUS	Power equipment
E-POWR-SITE	CONTINUOUS	Site power
E-POWR-SITE-EXST	CONTINUOUS	Existing site power
E-POWR-WALL	CONTINUOUS	Power wall outlets and receptacles
E-SECT	CONTINUOUS	Sections
E-SYMS	CONTINUOUS	Symbols
E-TEXT	CONTINUOUS	Text
Z-BRDR	CONTINUOUS	Standard 2nd sheet border
Z-BRDR-CHECK	CONTINUOUS	Check print across title block
Z-CONST	CONTINUOUS	Construction lines (no plot)
Z-NOPLOT	CONTINUOUS	No plot
Z-README	CONTINUOUS	Operator information for the drawing
Z-SYMS-GENR	CONTINUOUS	General sheet info: scales, north arrow, title bubbles, etc.

Electrical Auxillary

Layer List for S:\PROTO\Elecaux.dwt

Layer Name	Linetype	Description
E-CCTV	CONTINUOUS	Closed circuit TV
E-COMM	CONTINUOUS	Telephone communication outlets
E-DETL	CONTINUOUS	Details
E-DETL-ANNO	CONTINUOUS	Detail text and dimensioning
E-DETL-HTCH	CONTINUOUS	Detail hatch patterns
E-DETL-HTCH-BDRY	CONTINUOUS	Detail hatch pattern boundary
E-DETL-OBJT	CONTINUOUS	Detail objects
E-DIMS	CONTINUOUS	Dimensions
E-ELEV	CONTINUOUS	Elevations
E-FIRE	CONTINUOUS	Fire alarm and fire extinguishers
E-HTCH	CONTINUOUS	Hatching
E-INTC	CONTINUOUS	Intercom system
E-LTNG	CONTINUOUS	Lightning protection system
E-SECT	CONTINUOUS	Sections
E-SERT	CONTINUOUS	Security
E-SOUN	CONTINUOUS	Sound or PA system
E-SYMS	CONTINUOUS	Symbols
E-TEXT	CONTINUOUS	Text
Z-BRDR	CONTINUOUS	Standard 2nd sheet border
Z-BRDR-CHECK	CONTINUOUS	Check print across title block
Z-CONST	CONTINUOUS	Construction lines (no plot)
Z-NOPLOT	CONTINUOUS	No plot
Z-README	CONTINUOUS	Operator information for the drawing
Z-SYMS-GENR	CONTINUOUS	General sheet info: scales, north arrow, title bubbles, etc.

Fire

Layer List for S:\PROTO\Fire.dwt

Layer Name	Linetype	Description
F-DETL	CONTINUOUS	Details
F-DETL-ANNO	CONTINUOUS	Detail text and dimensioning
F-DETL-HTCH	CONTINUOUS	Detail hatch patterns
F-DETL-HTCH-BDRY	CONTINUOUS	Detail hatch boundary polylines
F-DETL-OBJT	CONTINUOUS	Detail objects
F-DIMS	CONTINUOUS	Dimensions
F-ELEV	CONTINUOUS	Elevations
F-HTCH	CONTINUOUS	Hatching
F-SECT	CONTINUOUS	Sections
F-SPRN	CONTINUOUS	Fire protection sprinkler system
F-SPRN-CLHD	CONTINUOUS	Sprinkler head (ceiling)
F-SPRN-OTHD	CONTINUOUS	Sprinkler head (other)
F-SPRN-PIPE	CONTINUOUS	Sprinkler piping
F-STAN	CONTINUOUS	Fire protection standpipe system
F-SYMS	CONTINUOUS	Symbols
F-TEXT	CONTINUOUS	Text
Z-BRDR	CONTINUOUS	Standard 2nd sheet border
Z-BRDR-CHECK	CONTINUOUS	Check print across title block
Z-CONST	CONTINUOUS	Construction lines (no plot)
Z-NOPLOT	CONTINUOUS	No plot
Z-README	CONTINUOUS	Operator information for the drawing
Z-SYMS-GENR	CONTINUOUS	General sheet info: scales, north arrow, title bubbles, etc.

LA Details

Layer List for S:\PROTO\Ladetl.dwt

Layer Name	Linetype	Description
L-DETL	CONTINUOUS	Details
L-DETL-ANNO	CONTINUOUS	Detail text and dimensioning
L-DETL-HTCH	CONTINUOUS	Detail hatch patterns
L-DETL-HTCH-BDRY	CONTINUOUS	Detail hatch boundary polylines
L-DETL-OBJT	CONTINUOUS	Detail objects
L-DIMS	CONTINUOUS	Dimensions
L-ELEV	CONTINUOUS	Elevations
L-HTCH	CONTINUOUS	Hatching
L-SCHD	CONTINUOUS	Schedules
L-SECT	CONTINUOUS	Sections
L-SYMS	CONTINUOUS	Symbols
L-TEXT	CONTINUOUS	Text
Z-BRDR	CONTINUOUS	Standard 2nd sheet border
Z-BRDR-CHECK	CONTINUOUS	Check print across title block
Z-CONST	CONTINUOUS	Construction lines (no plot)
Z-NOPLOT	CONTINUOUS	No plot
Z-README	CONTINUOUS	Operator information for the drawing
Z-SYMS-GENR	CONTINUOUS	General sheet info: scales, north arrow, title bubbles, etc.

LA Site

Layer List for S:\PROTO\Lasite.dwt

Layer Name	Linetype	Description
L-BLDG	CONTINUOUS	Building
L-BLDG-EXST	CONTINUOUS	Existing building
L-DETL	CONTINUOUS	Details
L-DETL-ANNO	CONTINUOUS	Detail text and dimensioning
L-DETL-HTCH	CONTINUOUS	Detail hatch patterns
L-DETL-HTCH-BDRY	CONTINUOUS	Detail hatch boundary polylines
L-DETL-OBJT	CONTINUOUS	Detail objects
L-DIMS	CONTINUOUS	Dimensions
L-ELEV	CONTINUOUS	Elevations
L-HTCH	CONTINUOUS	Hatching
L-IRRG	CONTINUOUS	Irrigation system
L-PKNG	CONTINUOUS	Parking
L-PLNT	CONTINUOUS	Plant and landscape materials
L-PROP	CONTINUOUS	Property lines and survey benchmarks
L-ROAD	CONTINUOUS	Roads
L-SECT	CONTINUOUS	Sections
L-SITE	CONTINUOUS	Site improvements
L-SYMS	CONTINUOUS	Symbols
L-TEXT	CONTINUOUS	Text
L-TOPO	CONTINUOUS	Index contour lines and elevations
L-TOPO-EXST	CONTINUOUS	Existing index contour lines and elevations
L-TOPO-INTR	CONTINUOUS	Intermediate contour lines
L-TOPO-INTR-EXST	CONTINUOUS	Existing intermediate contour line
L-WALK	CONTINUOUS	Walks and steps
Z-BRDR	CONTINUOUS	Standard 2nd sheet border
Z-BRDR-CHECK	CONTINUOUS	Check print across title block
Z-CONST	CONTINUOUS	Construction lines (no plot)
Z-NOPLOT	CONTINUOUS	No plot
Z-README	CONTINUOUS	Operator information for the drawing
Z-SYMS-GENR	CONTINUOUS	General sheet info: scales, north arrow, title bubbles, etc.

Mechanical

Layer List for S:\PROTO\Mech.dwt

Layer Name	Linetype	Description
M-CONT	CONTINUOUS	Controls and instrumentation
M-CWTR-EQPM	CONTINUOUS	Chilled water equipment
M-CWTR-RTRN	CHILL_RETURN	Chilled water return piping
M-CWTR-SUPL	CHILL_SUPPLY	Chilled water supply piping
M-DETL	CONTINUOUS	Details
M-DETL-ANNO	CONTINUOUS	Detail text and dimensioning
M-DETL-HTCH	CONTINUOUS	Detail hatch patterns
M-DETL-HTCH-BDRY	CONTINUOUS	Detail hatch boundary polylines
M-DETL-OBJT	CONTINUOUS	Detail objects
M-DIMS	CONTINUOUS	Dimensions
M-ELEV	CONTINUOUS	Elevations
M-ELHT-EQPM	CONTINUOUS	Electric heat equipment
M-EXHS	CONTINUOUS	Exhaust system
M-EXHS-DUCT	CONTINUOUS	Exhaust system ductwork
M-EXHS-EQPM	CONTINUOUS	Exhaust system equipment
M-EXHS-RFEQ	CONTINUOUS	Rooftop exhaust equipment
M-FUEL	CONTINUOUS	Fuel system piping
M-HOTW-EQPM	CONTINUOUS	Hot water equipment
M-HOTW-RTRN	HOT_RETURN	Heating water return piping
M-HOTW-SUPL	HOT_SUPPLY	Heating water supply piping
M-HTCH	CONTINUOUS	Hatching
M-HVAC	CONTINUOUS	HVAC system
M-HVAC-CDFF	CONTINUOUS	HVAC diffusers (ceiling)
M-HVAC-DUCT	CONTINUOUS	HVAC ductwork
M-HVAC-EQPM	CONTINUOUS	HVAC equipment
M-HVAC-ODFF	CONTINUOUS	HVAC diffusers (other)
M-SECT	CONTINUOUS	Sections
M-SYMS	CONTINUOUS	Symbols
M-TEXT	CONTINUOUS	Text
Z-BRDR	CONTINUOUS	Standard 2nd sheet border
Z-BRDR-CHECK	CONTINUOUS	Check print across title block
Z-CONST	CONTINUOUS	Construction lines (no plot)
Z-NOPLOT	CONTINUOUS	No plot
Z-README	CONTINUOUS	Operator information for the drawing
Z-SYMS-GENR	CONTINUOUS	General sheet info: scales, north arrow, title bubbles, etc.

Plumbing

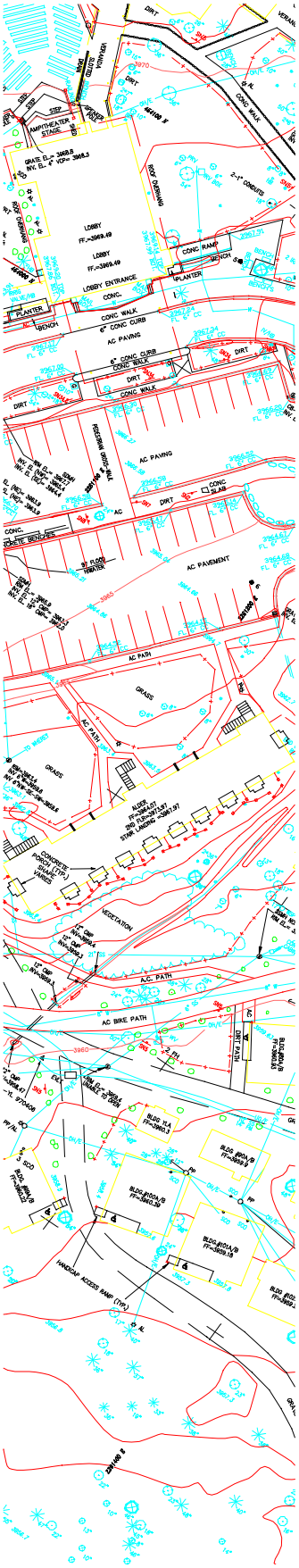
Layer List for S:\PROTO\Plumb.dwt

Layer Name	Linetype	Description
P-DETL	CONTINUOUS	Details
P-DETL-ANNO	CONTINUOUS	Detail text and dimensioning
P-DETL-HTCH	CONTINUOUS	Detail hatch patterns
P-DETL-HTCH-BDRY	CONTINUOUS	Detail hatch boundary polylines
P-DETL-OBJT	CONTINUOUS	Detail objects
P-DIMS	CONTINUOUS	Dimensions
P-DOMW-COLD	COLDWATER	Domestic cold water
P-DOMW-EQPM	CONTINUOUS	Domestic hot and cold water equipment
P-DOMW-HOTR	HOTRTN	Domestic hot water return
P-DOMW-HOTS	HOTWATER	Domestic hot water supply
P-DOMW-PIPE	CONTINUOUS	Domestic hot and cold water piping
P-DOMW-RISR	CONTINUOUS	Domestic hot and cold water risers
P-ELEV	CONTINUOUS	Elevations
P-HTCH	CONTINUOUS	Hatching
P-SANR	CONTINUOUS	Sanitary drainage
P-SANR-FIXT	CONTINUOUS	Plumbing fixtures
P-SANR-FLDR	CONTINUOUS	Floor drains
P-SANR-PIPE	CONTINUOUS	Sanitary piping
P-SANR-RISR	CONTINUOUS	Sanitary risers
P-SECT	CONTINUOUS	Sections
P-STRM	CONTINUOUS	Storm drainage system
P-STRM-PIPE	CONTINUOUS	Storm drain piping
P-STRM-RFDR	CONTINUOUS	Roof drains
P-STRM-RISR	CONTINUOUS	Storm drain risers
P-SYMS	CONTINUOUS	Symbols
P-TEXT	CONTINUOUS	Text
P-VENT	VENT	Vent
P-WASTE	WASTEUG	Waste - below grade
Z-BRDR	CONTINUOUS	Standard 2nd sheet border
Z-BRDR-CHECK	CONTINUOUS	Check print across title block
Z-CONST	CONTINUOUS	Construction lines (no plot)
Z-NOPLOT	CONTINUOUS	No plot
Z-README	CONTINUOUS	Operator information for the drawing
Z-SYMS-GENR	CONTINUOUS	General sheet info: scales, north arrows, title bubbles, etc.

Structural

Layer List for S:\PROTO\Struc.dwt

Layer Name	Linetype	Description
S-ABLT	CONTINUOUS	Anchor bolts
S-BEAM	CONTINUOUS	Beams
S-COLS	CONTINUOUS	Columns
S-DETL	CONTINUOUS	Details
S-DETL-ANNO	CONTINUOUS	Detail text and dimensioning
S-DETL-HTCH	CONTINUOUS	Detail hatch patterns
S-DETL-HTCH-BDRY	CONTINUOUS	Detail hatch boundary polylines
S-DETL-OBJT	CONTINUOUS	Detail objects
S-DIMS	CONTINUOUS	Dimensions
S-ELEV	CONTINUOUS	Elevations
S-FNDN	CONTINUOUS	Foundation
S-FNDN-PILE	CONTINUOUS	Foundation piles and drilled piers
S-FNDN-RBAR	CONTINUOUS	Foundation reinforcing
S-FRAM-BEAM	CONTINUOUS	Framing beams
S-FRAM-DECK	CONTINUOUS	Framing structural floor deck
S-FRAM-JOIS	CONTINUOUS	Framing joists
S-GRID	CONTINUOUS	Column grid
S-GRID-IDEN	CONTINUOUS	Column grid tags
S-HTCH	CONTINUOUS	Hatching
S-METL	CONTINUOUS	Miscellaneous metal
S-SECT	CONTINUOUS	Sections
S-SECT-IDENT	CONTINUOUS	Section identification
S-SLAB	CONTINUOUS	Slab
S-SLAB-JOIN	CONTINUOUS	Slab control joints
S-SLAB-RBAR	CONTINUOUS	Slab reinforcing
S-SYMS	CONTINUOUS	Symbols
S-TEXT	CONTINUOUS	Text
S-WALL	CONTINUOUS	Structural bearing and shear walls
Z-BRDR	CONTINUOUS	Standard 2nd sheet border
Z-BRDR-CHECK	CONTINUOUS	Check print across title block
Z-CONST	CONTINUOUS	Construction lines (no plot)
Z-NOPLOT	CONTINUOUS	No plot
Z-README	CONTINUOUS	Operator information for the drawing
Z-SYMS-GENR	CONTINUOUS	General sheet info: scales, north arrow, title bubbles, etc.



Appendix B

DSC Command Add-ons

Appendix B
DSC Command Add-ons

The AutoCAD commands listed below have been created for use at DSC and can be typed in on the command line, or can be accessed from the NPS menu.

DSC Commands Add-ons

2ldr - Creates a leader line using two arcs and an arrowhead.

2lldr - Creates a loop leader line using two arcs.

2tldr - Creates a leader pointing to an area, using two arcs.

angle - Returns an angle by picking a vertex and beginning and ending angle

arctxt - Draws text around an arc or circle object

atext - Draws text around an arc or circle object

ba - Macro to break an object in two at a single point

batt - Draws batt insulation using a polyline

'between - Locate a point midway between two points

bolt - Draws a bolt based on user input

burst - Explodes blocks, but retains attribute contents

chlayer - Changes the layer of objects. Creates the layer if it does not exist.

chline - Globally change properties of line objects

chpoly - Globally change properties of heavy polylines. Change plinegen, bulge fix and remove xdata.

cht - Globally change text properties

chtexth - Globally change text height of text or mtext

conse - Erase construction lines, but not other objects.

consline - Draw lines on a construction layer, in a no-plot color.

conspt - Draw points on a construction layer, in a no-plot color.

consx - Draw a horizontal xline on a construction layer, in a no-plot color.

consxy - Draw a horizontal and vertical xline on a construction layer, in a no-plot color.

consy - Draw a vertical xline on a construction layer, in a no-plot color.

copyrot8 - Copy and rotate together in one command

cpprop - Change properties (layer, color, linetype) of objects to those properties of an example object

cswap - Swap colors in your drawing to bylayer, or for example, change all red objects to yellow. Also works with objects in blocks.

ddpen - NPS Standard Color Chart. Can be used transparently with 'ddpen.

ddsc/ddscalemarkers - Inserts scale markers

ddwelds - Inserts weld symbols

dets - Inserts detail titles

dtid - Inserts detail reference ID's as shown on page 21 of NPS-10

dwiz - Dimension Wizard will set up Dimension Styles for you

explore - (NT4.0 and Win95 only) - Starts Windows Explorer in the folder of the current drawing.

f0 - (That's "F" and a Zero) - Fillet radius zero

fcr - Macro to draw a rectangular 3d-face by picking 2 corners. Includes an elevation option.

fixldr1 - Forces leaders to have arrowheads rather than ticks or other user defined blocks.

fixmirdim - Fixes the r13c4 and r13c4a bug when mirroring dimensions (the dim text is backwards).

fr - Inserts stacked fractions

'glr - Returns the layer of a selected object, esp. useful within a block or xref.

gridline - Inserts grid lines and grid marks

gridmark - Inserts grid marks

iconmenu - Insert DSC symbols, 2nd sheets, details etc. from an icon driven menu

keynote - Inserts keyed notes in your drawing

ldr - Creates an arc leader line

leo - "Layer Exclusive On" turns all layers off except those you specify by name or by picking objects

leu - "Layer Exclusive Unlock" locks all layers except those you specify by name or by picking objects

lfrz - Freeze layers by name or by picking objects

lldr - Creates an arc style loop leader line

llist - Creates a text file listing the current drawing's layer settings

llock - Lock layers by name or by picking objects

loff - Turn off layers by name or by picking objects

lon - Macro to turn on all layers

lql - Quick leader - loop. Also offers leader options through a dialogue box.

ls - Changes the current layer to the layer name typed or to that of a selected object.

lthaw - Macro to thaw all layers

lunlock - Unlock layers by name or by picking layers

mask - Mask objects behind text or other objects

npscommands - Lists all DSC customized commands and a description of each

npsmenu - Reloads the NPS menus. Use if changing the main menu has caused sub-menus to unload.

nut - Draws a nut based on user input

openxref - Allows editing of xref drawing by opening two autocad sessions

pdir - Creates project paths on the P: drive

pen - Set your current layer, color, linetype to those properties of a selected object

perpdoff - Set crosshairs (snapang) to zero

perpdon - Set crosshairs (snapang) to angle of a selected line

plrev - Reverse a polyline's start/end

qpurge - (R14) A quick way to purge all objects in the drawing. Executes purge multiple times to purge nested objects.

rmelev - Inserts room elevation callout bubbles

'se - "Select by Entity" is a quick way to select specific types of objects (quicker than Filter)

sect - Inserts section cuts

shapes - AISC steel shapes. Dialogue boxes prompt for user input.

'sl - "Select by Layer" is a quick way to select objects by the layer they're on (quicker than Filter)

t2mt - Convert Text to Mtext

tldr - Creates an arc style leader pointing to an area

tmenu - A text only replacement for the Iconmenu command. Useful when your screen resolution is to low to run Iconmenu.

topoly - Joins polylines, lines and arcs into continuous polylines. Faster then using Pedit/Join.

tql - Quick leader into an area. Also offers leader options through a dialogue box

tset - Set your current text font, height etc. to those of existing text object

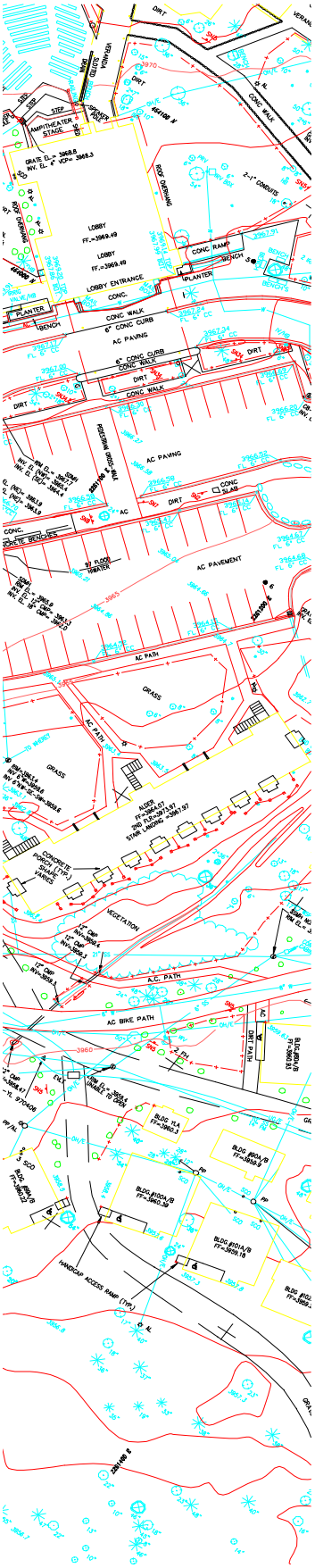
twiz - Text Wizard will set up Text Styles for you

two - Text wipeout. A text mask for Rel. 14. Supports only dtext.

vpsc - Reports a viewport's scale I.E. 48.00 to 1.

websec - Draws cross section of common steel shapes

wpoints - Write point coordinate data to a text file



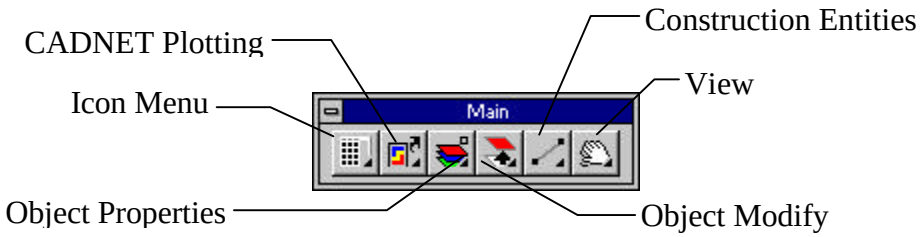
Appendix C

DSC Custom Toolbars

Appendix C
NPS Custom Toolbars

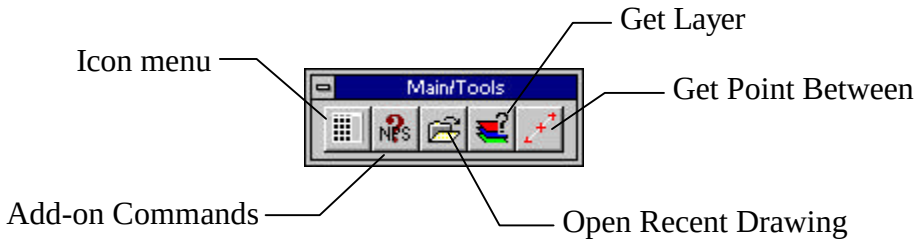
Below is a graphic representation of the NPS Main Toolbar. Additional main tools can be accessed from the flyouts off of the main toolbar or from individual toolbars that are grouped by function. To access the NPS tools in AutoCAD, select the toolbar, click on the icon and follow the prompts. For a description of the individual icon functions see Appendix D.

NPS Main Toolbar

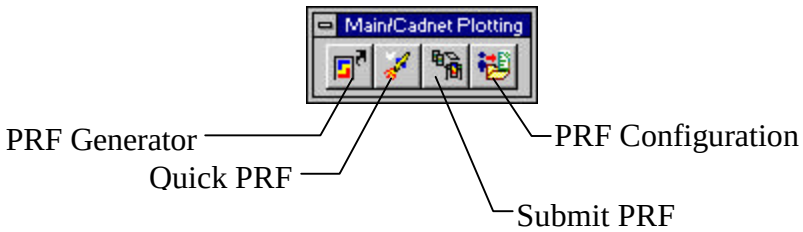


The tools available from the flyouts on the Main Toolbar have also been incorporated into individual toolbars, as shown below.

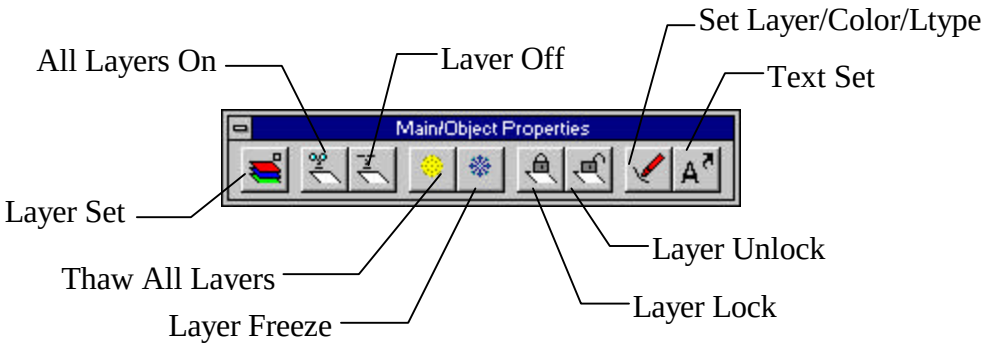
Main/Tools



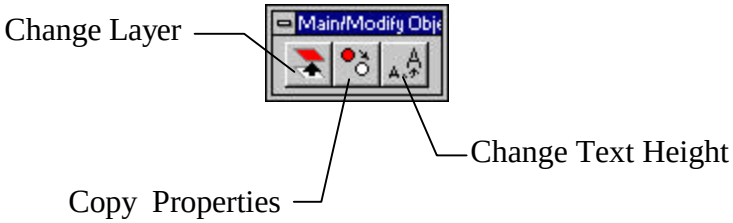
Main/CADNET Plotting



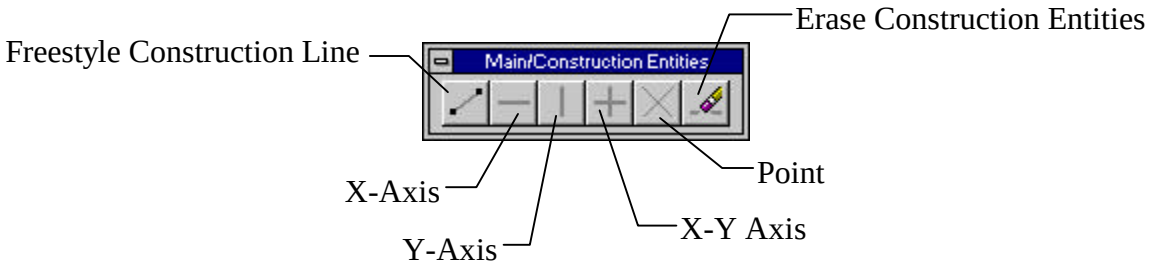
Main/Object Properties



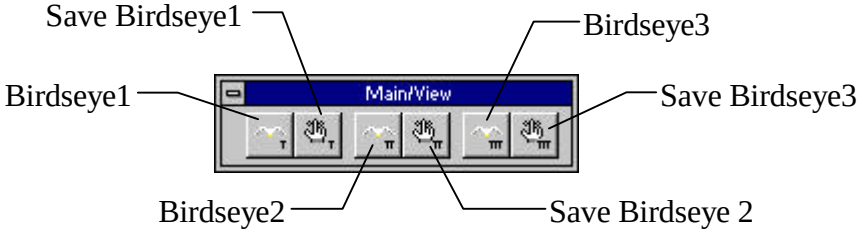
Main/Modify Objects



Main/Construction Entities



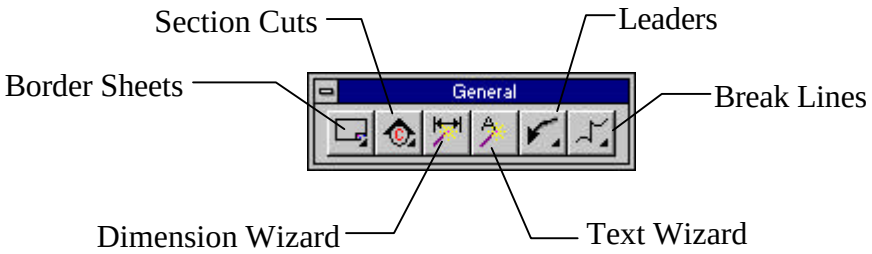
Main/View



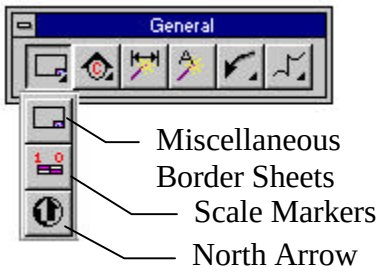
NPS General Toolbar

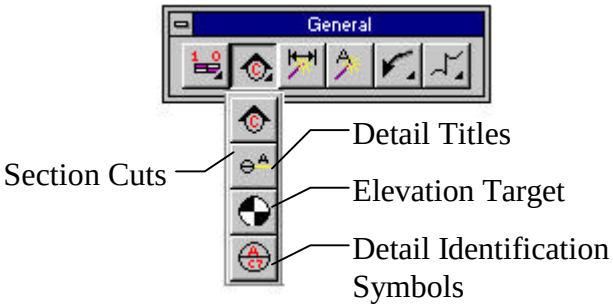
The General Toolbar was developed to be used by all disciplines. It contains the standard drawing sheet symbols for NPS drawings and is divided into four flyouts and two 'wizard' selections. See Appendix D for individual icon descriptions.

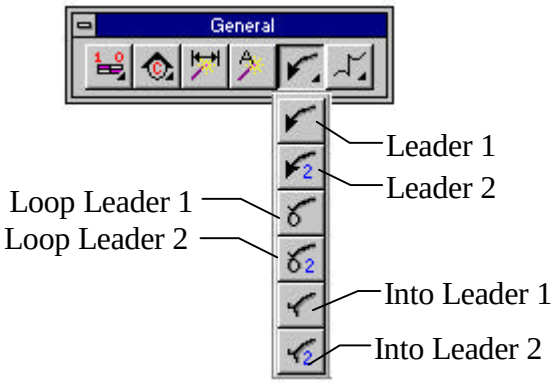
General Toolbar

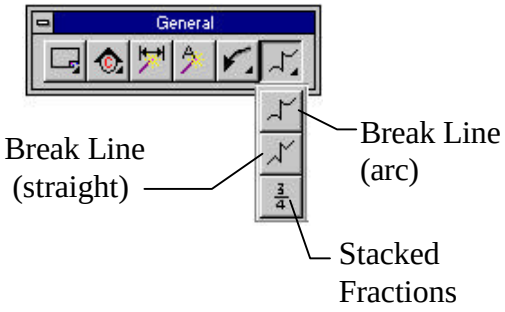


General Toolbar Flyouts





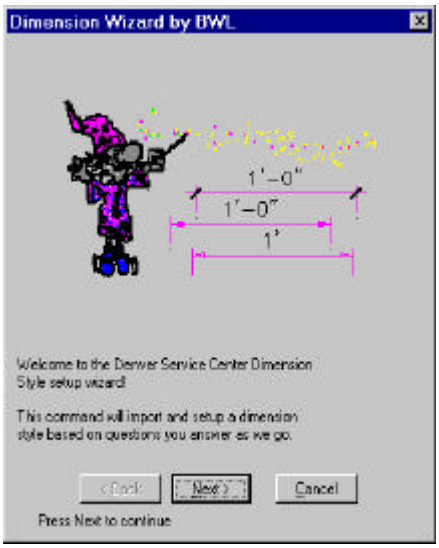




NPS Wizards

The Text Wizard and Dimension Wizard were developed to simplify the setup process for creating NPS standard text styles and dimension styles. The 'wizards' are accessed by selecting the icon from the NPS General Toolbar. A dialogue box will appear prompting for user selected settings.

Text Wizard

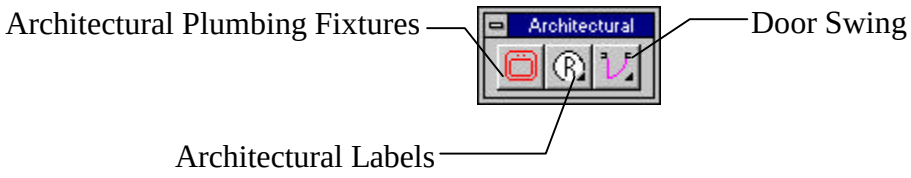


Dimension Wizard

NPS Architectural Toolbar

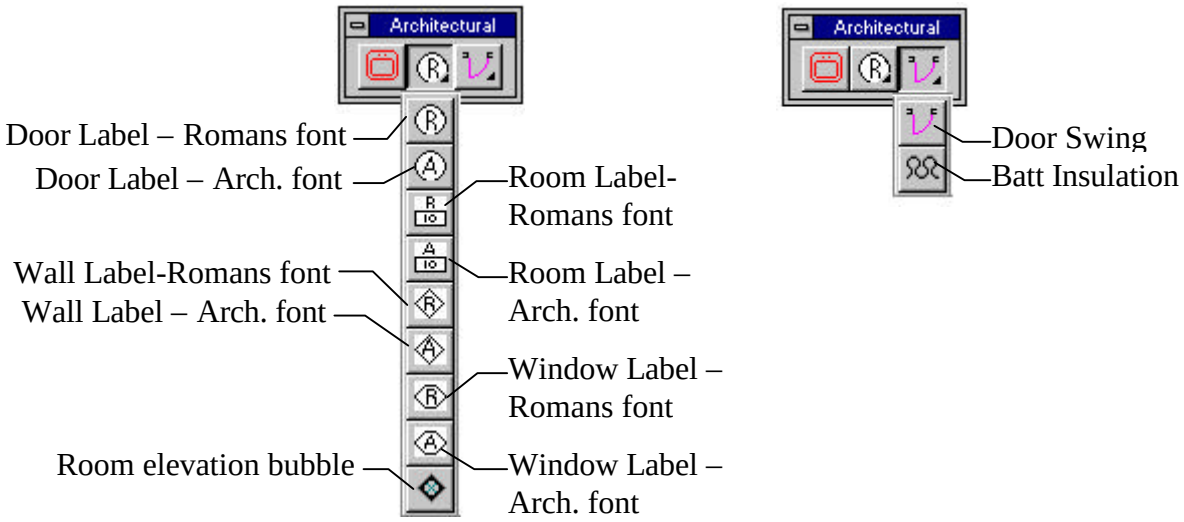
The Architectural Toolbar below has been created to support the architectural design features.

Architectural Toolbar



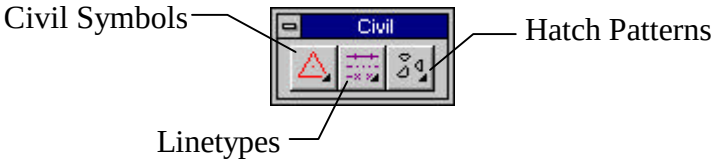
The first icon on the Architectural Toolbar will take the user to an icon menu which will offer a variety of architectural plumbing symbols. The second icon offers door, wall and window labels, accessible from a flyout. The third icon offers two routines - one for creating door swings, and the other for creating batt insulation. For a list and description of individual icons, see Appendix D. For a list and description of the individual symbols, see Appendix E.

Architectural Toolbar Flyouts

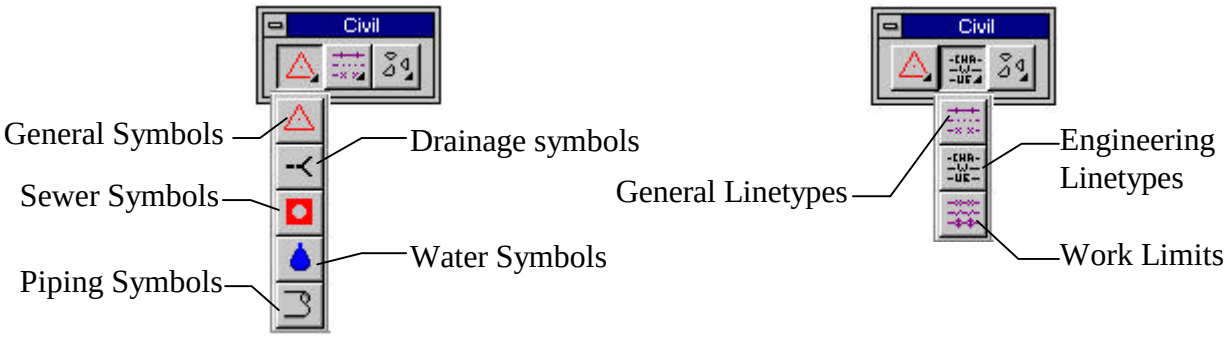


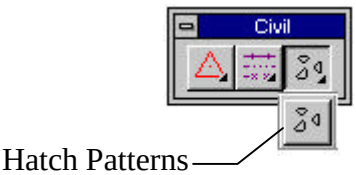
NPS Civil Toolbar

The Civil Toolbar is divided into four flyouts, which encompass civil symbols, linetypes, hatch patterns and standard details. Each flyout takes the user to an icon menu for selection of individual symbols. See Appendix D for a description of the individual icons, and Appendix E for a description of the individual symbols.



Civil Toolbar Flyouts

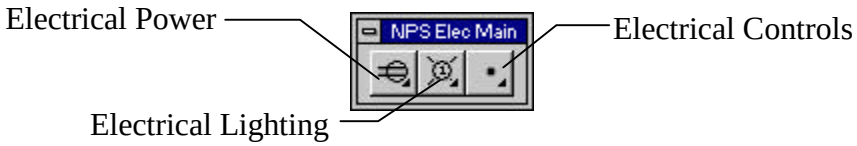




NPS Electrical Toolbar

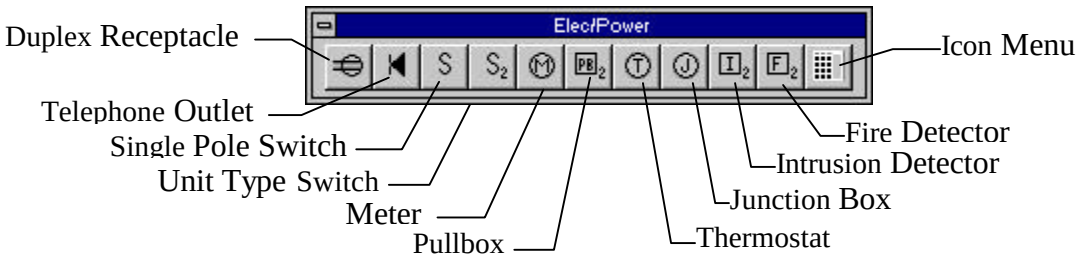
The Electrical Toolbar offers the users tools that can be accessed from flyouts off the main electrical toolbar or from individual toolbars that have been grouped by function. The electrical tools have been grouped into three categories - power, lighting and controls.

NPS Electrical Main Toolbar

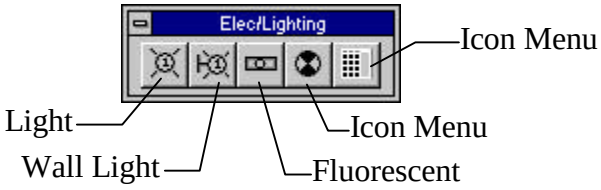


The individual toolbars created for power, lighting and controls offer users immediate access to the most often used graphic symbols for each function. The last icon on each toolbar takes the user to the icon menu for additional symbols. For a description of the individual symbols, see Appendix E.

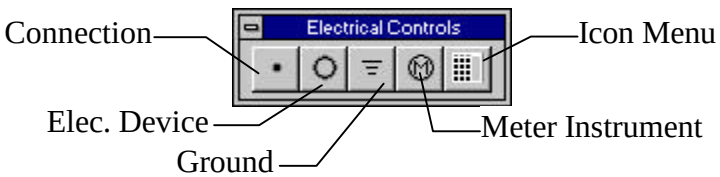
Elec/Power



Elec/Lighting



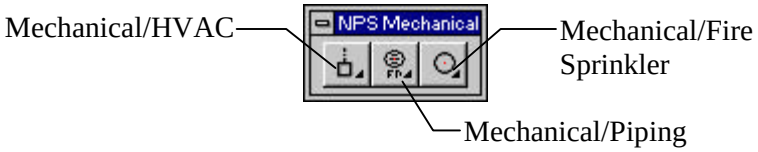
Elec/Controls



NPS Mechanical Toolbar

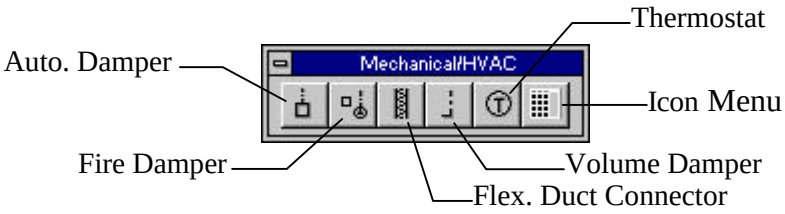
The Mechanical Toolbar offers the users tools that can be accessed from flyouts off the main mechanical toolbar or from individual toolbars that have been grouped by function. The mechanical tools have been grouped into three categories - HVAC, piping and fire sprinkler systems.

Mechanical Main Toolbar

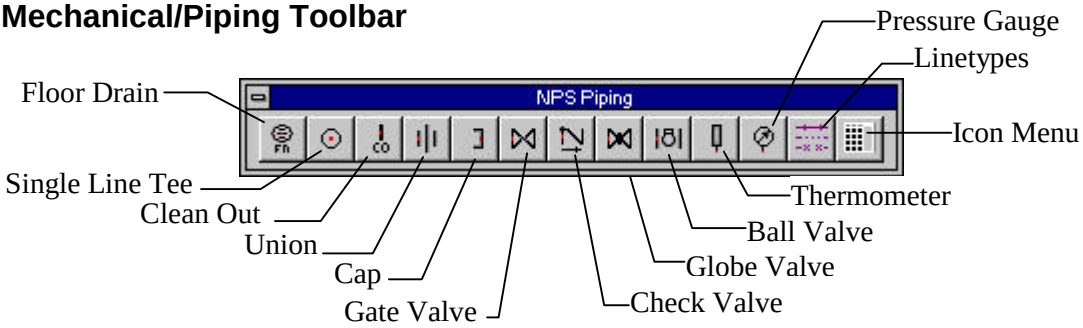


The individual toolbars created for HVAC, piping and fire sprinkler systems offer users immediate access to the most often used graphic symbols. The last icon on each toolbar takes the user to the icon menu for additional symbols. For a description of the individual symbols, see Appendix E.

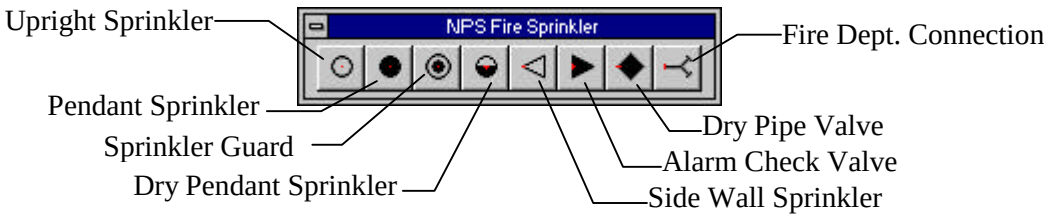
Mechanical/HVAC Toolbar



Mechanical/Piping Toolbar

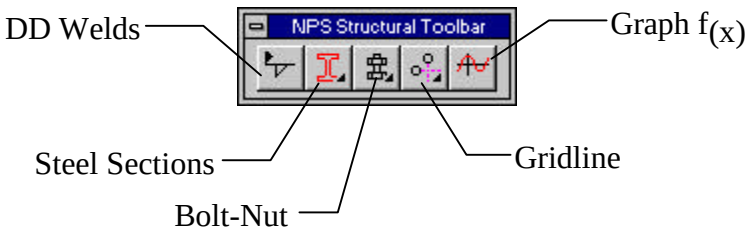


Mechanical/Fire Sprinkler Toolbar

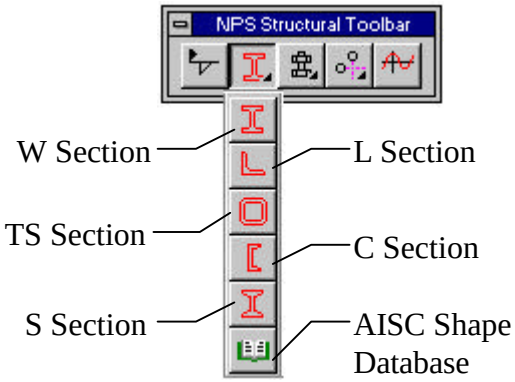


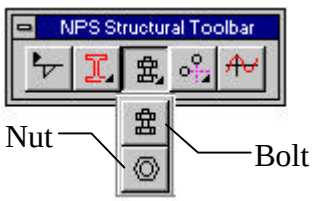
NPS Structural Toolbar

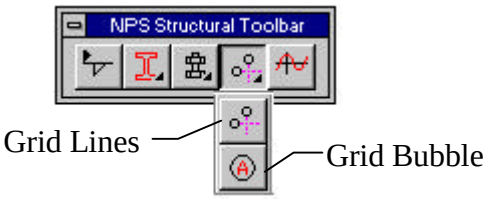
The Structural Toolbar was developed to aid in the design and representation of structural elements throughout the design and construction documents.

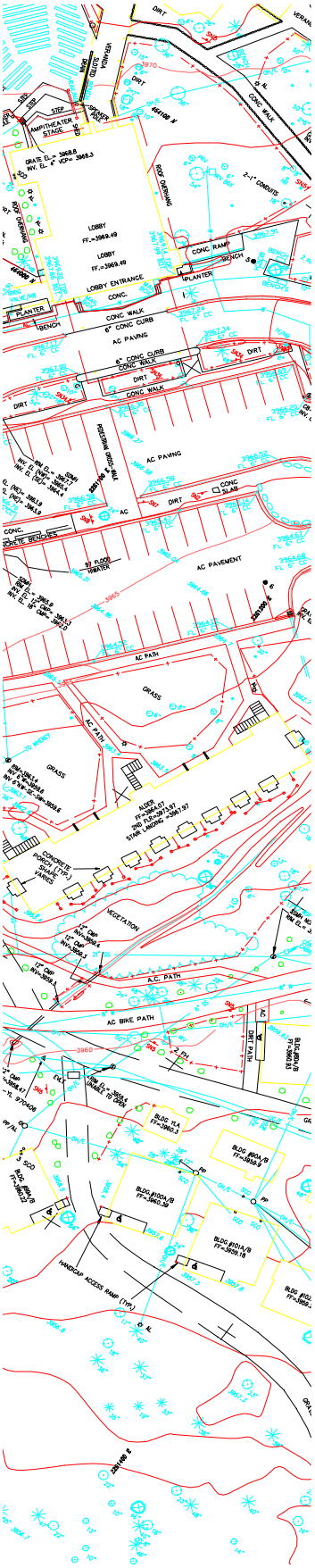


Structural Toolbar Flyouts









Appendix D

DSC Icon Descriptions

Appendix D
NPS Icon Descriptions

Note: The following buttons are grouped so that all functions on a toolbar are together. The order of the toolbars is the same order reflected in Appendix C.

Function Name	Icon	Description
NPS Main Toolbar		
Main Tools		Offers Main/Tools on a flyout
CADNET Plotting		Offers CADNET plotting tools on a flyout
Object Properties		Offers object property tools on a flyout
Modify Tools		Offers object modify tools on a flyout
Construction Entities		Offers construction entity tools on a flyout
View		Offers view tools on a flyout
Main/Tools		
Icon Menu		Brings up an icon menu for selection of symbols
Add-on Commands		Custom Commands developed for DSC use
Open Recent Drawing		Displays a list of recently opened drawings for user selection
Get Layer		Displays the layer of user selected object
Get Point Between		Allows user to find midpoint of 2 selected points while in a command
Main/CADNET Plotting		
PRF Generator		Brings up CADNET's PRF Generator dialogue box for modifying plot parameters
Quick PRF		Creates .prf files using default parameters

Function Name	Icon	Description
Submit PRF		Allows user to submit previously created .prf files or groups of files
PRF Configuration		Allows user to direct prints or plots to selected printer or plotter, using preset parameters
Main/Object Properties		
Layer Set		Set current layer
All Layers On		Turns on all layers
Layer Off		Turns off selected layers
Thaw all layers		Thaws all layers
Layer Freeze		Freezes selected layers
Layer Lock		Locks selected layers
Layer Unlock		Unlocks selected layers
Set Layer/Color/Ltype		Sets layer, color and/or linetype to match existing objects
Text Set		Select text to match attributes
Main/Modify Objects		
Change Layer		Changes the layer of objects
Copy Properties		Changes properties to match selected objects
Change Text Height		Changes text height of selected text
Main/Construction Entities		
Freestyle Construction Line		Construction line drawn in no-plot pen
X-axis		Draws construction line across x-axis at point specified
Y-axis		Draws construction line across y-axis at point specified

Function Name	Icon	Description
X-Y axis		Draws construction line across x and y axis at point specified
Point		Places a point (node) at user specified location (no plot)
Erase Construction Entities		Erases selected construction entities
Main/View		
Birdseye 1		Transparent zoom (1)
Save Birdseye 1		Save view of Birdseye 1
Birdseye 2		Transparent zoom (2)
Save Birdseye 2		Save view of Birdseye 2
Birdseye 3		Transparent zoom (3)
Save Birdeye 3		Save view of birdseye 3
General Toolbar Flyouts		
Insert 2nd Sheet		Takes user to the icon menu for selection of 2nd sheet border
Scale Markers		Inserts graphic scale marker based on user input
North Arrow		Inserts north arrow based on user input
Section cuts		Inserts section cuts based on user input
Detail Titles		Inserts detail/section titles based on user input
Elevation Target		Inserts elevation target based on user input
Detail Identification Symbols		Inserts detail bubbles based on user input
Text Wizard		Creates NPS standard text styles based on user input

Function Name	Icon	Description
Dimension Wizard		Creates and loads standard dimension styles based on user input
Leader 1		Draws arc leader line - 3 points - last point places arrowhead
Leader 2		Draws double arc leader line - 4 points - last point places arrowhead
Loop Leader 1		Draws arc leader line - 3 points - last point places a loop
Loop Leader 2		Draws double arc leader line - 4 points - last point places a loop
Into Leader 1		Draws arc leader line - 3 points - last point places an arrowhead/tilde
Into Leader 2		Draws double arc leader line - 4 points - last point places an arrrowhead/tilde
Break Line (arc)		Draws a break line and inserts an arc style break in the center
Break Line (straight)		Draws a break line and inserts a straight style break in the center
Stacked Fractions		Inserts stacked fractions based on user input
Architectural Toolbar		
Architectural Plumbing Features		Takes the user to an icon menu for a selection of plumbing features
Architectural Labels		Flyout offering door, room, wall and window labels in both the romans font and the arch font
Door Swing		Flyout offering door swing and batt insulation
Architectural Flyouts		
Door Label		Door labels - Romans font
Door Label		Door labels - Architectural font

Function Name	Icon	Description
Room Label		Room labels - Romans font
Room Label		Room labels - Architectural font
Wall Label		Wall labels - Romans font
Wall Label		Wall labels - Architectural font
Window Label		Window labels - Romans font
Window Label		Window labels - Architectural font
Room Elevation		Room elevation bubble
Door Swing		Routine prompts for door swing placement
Batt Insulation		Routine prompts for batt insulation placement

Civil Toolbar Flyouts

Civil Symbols

General Symbols		Takes user to the icon menu for selection of general civil symbols
Drainage Symbols		Takes user to the icon menu for selection of drainage symbols
Sewer Symbols		Takes user to the icon menu for selection of sewer symbols
Water Symbols		Takes user to the icon menu for selection of water symbols
Plumbing Symbols		Takes user to the icon menu for selection of piping/plumbing symbols

Civil Linetypes

General Linetypes		Takes user to the icon menu for selection of general linetypes
Engineering Linetypes		Takes user to the icon menu for selection of engineering linetypes

Function Name	Icon	Description
Site Linetypes		Takes user to the icon menu for selection of site linetypes
Civil Hatch Patterns		
General Hatch Patterns		Takes user to the icon menu for site related hatch patterns

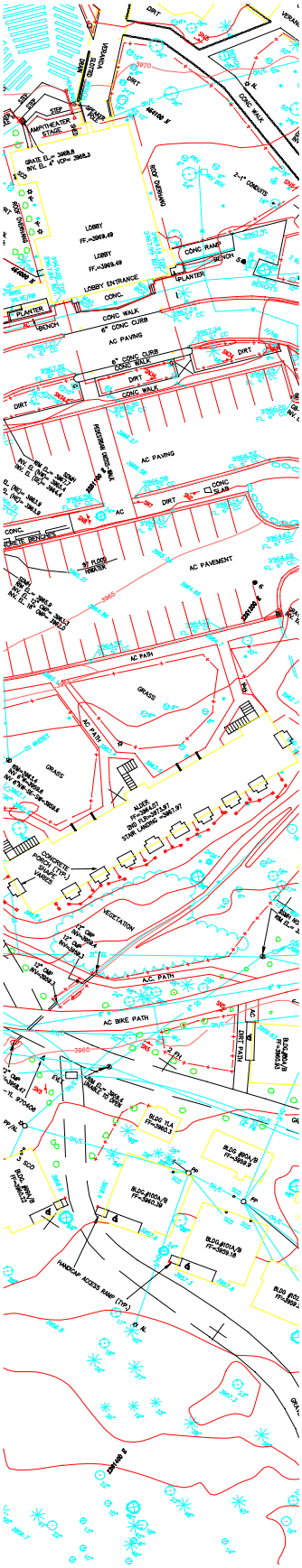
Electrical Toolbar Flyouts

Electrical/Power		
Duplex receptacle		Inserts symbol based on user input
Telephone outlet		Inserts symbol based on user input
Single pole switch		Inserts symbol based on user input
Unit type switch		Inserts symbol based on user input
Meter		Inserts symbol based on user input
Pullbox		Inserts symbol based on user input
Thermostat		Inserts symbol based on user input
Junction box		Inserts symbol based on user input
Intrusion detector		Inserts symbol based on user input
Fire detector		Inserts symbol based on user input
Icon Menu		Takes user to the icon menu for selection of additional electrical power symbols
Electrical/Lighting		
Light		Inserts symbol based on user input
Wall Light		Inserts symbol based on user input
CM Fluorescent		Inserts symbol based on user input
Exit Light		Inserts symbol based on user input

Function Name	Icon	Description
Icon Menu		Takes user to the icon menu for selection of additional electrical lighting symbols
Electrical/Controls		
Connection		Inserts symbol based on user input
Electrical Device		Inserts symbol based on user input
Ground Symbol		Inserts symbol based on user input
Meter Instrument		Inserts symbol based on user input
Icon Menu		Takes user to the icon menu for selection of additional electrical control symbols
Mechanical Toolbars		
Mechanical/HVAC		
Auto Damper		Inserts automatic damper symbol based on user input
Fire Damper		Inserts fire damper symbol based on user input
Flexible Duct Connector		Inserts flexible duct connector symbol based on user input
Volume Damper		Inserts volume damper symbol based on user input
Thermostat		Inserts thermostat symbol based on user input
Icon Menu		Takes user to an icon menu for selection of additional HVAC symbols
Mechanical/Piping		
Floor Drain		Inserts floor drain symbol based on user input
Single Line Tee		Inserts single line tee symbol based on user input
Clean Out		Inserts clean out symbol based on user input
Pipe Union		Inserts pipe union symbol based on user input

Function Name	Icon	Description
Pipe Cap		Inserts pipe cap symbol based on user input
Gate Valve		Inserts gate valve symbol based on user input
Check Valve		Inserts check valve symbol based on user input
Globe Valve		Inserts globe valve symbol based on user input
Ball Valve		Inserts ball valve symbol based on user input
Thermometer		Inserts thermometer symbol based on user input
Pressure Gage		Inserts pressure gage symbol based on user input
Piping Linetypes		Loads and initiates piping linetypes based on user input
Icon Menu		Takes user to an icon menu for selection of additional piping symbols
Mechanical/Fire Sprinkler		
Upright Sprinkler		Inserts upright sprinkler symbol based on user input
Pendant Sprinkler		Inserts pendant sprinkler symbol based on user input
Sprinkler Guard		Inserts sprinkler guard symbol based on user input
Dry Pendant Sprinkler		Inserts dry pendant sprinkler symbol based on user input
Side Wall Sprinkler		Inserts side wall sprinkler symbol based on user input
Alarm Check Valve		Inserts alarm check valve based on user input
Dry Pipe Valve		Inserts dry pipe valve symbol based on user input
Fire Department Connection		Inserts Fire Department connection symbol, based on user input.

Function Name	Icon	Description
Structural Toolbar		
DD Welds		Dialogue box for creating weld symbols
Graph $f_{(x)}$		Draws a graph of a mathematical expression based on user input using AutoCAD's calculator syntax.
Structural Toolbar Flyouts		
W Section		Draws structural steel W shape based on user input
L Section		Draws structural steel L shape based on user input
TS Section		Draws structural steel TS shape based on user input
C Section		Draws structural steel C shape based on user input
S Section		Draws structural steel S shape based on user input
AISC Shape Database		Reference for AISC steel shapes
Bolt		Draws a bolt based on user input
Nut		Draws a nut based on user input
Grid Lines		Draws grid lines based on user input
Grid Bubble		Draws grid bubble based on user input

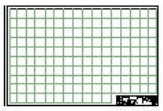
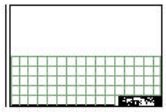
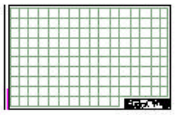
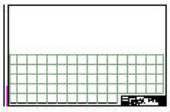


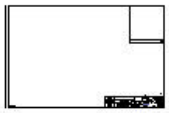
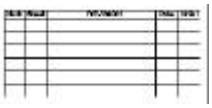
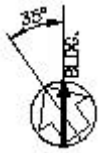
Appendix E

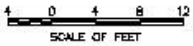
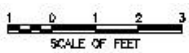
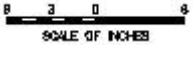
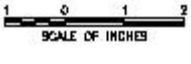
DSC Symbol Libraries

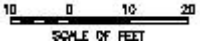
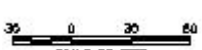
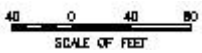
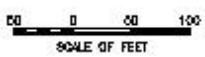
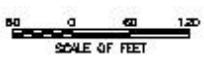
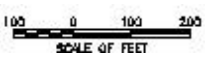
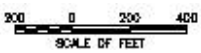
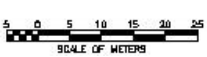
Appendix E
Symbols

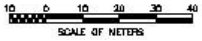
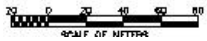
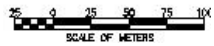
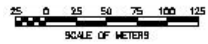
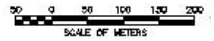
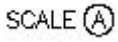
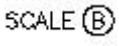
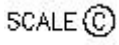
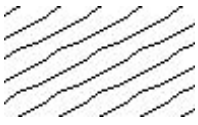
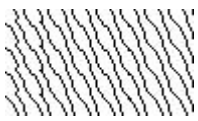
In listing the pathname for the symbols below, s:\ represents the DSC network drive for AutoCAD support files. This location may differ outside of DSC. The "IM Group", "IM Category", and "IM Topic" show you where to find the symbol in the DSC custom icon menu command. Refer to page 4-7, Symbols, Icon Menu for a complete description.

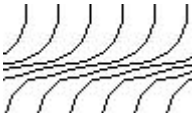
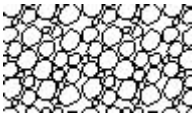
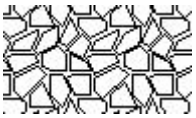
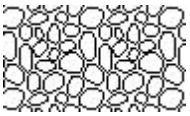
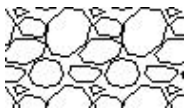
Symbol	Description	Symbol File Access		
		IM Group	IM Category	IM Topic
		Pathname		
	Standard 2nd sheet	Annotation	Border Sheets	Second Sheets
		s:\std\gen\2ndsht2e.dwg		
	Full Profile sheet	Annotation	Border Sheets	Second Sheets
		s:\std\gen\fulpro2a.dwg		
	Plan and profile sheet	Annotation	Border Sheets	Second Sheets
		s:\std\gen\plnpro2a.dwg		
	Standard 2nd sheet – Metric (insert at 25.4 scale factor)	Annotation	Border Sheets	Second Sheets
		s:\std\gen\2ndsht2e.dwg		
	36" border sheet (old 2nd sheet)	Annotation	Border Sheets	Second Sheets
		s:\std\gen\2ndsht1d.dwg		
	36" border sheet (old profile sheet)	Annotation	Border Sheets	Second Sheets
		s:\std\gen\fullpro1.dwg		
	36" border sheet (old plan and profile sheet)	Annotation	Border Sheets	Second Sheets
		s:\std\gen\planpro1.dwg		
	36" border sheet (old 2nd sheet - metric)	Annotation	Border Sheets	Second Sheets
		s:\std\gen\2ndsht1d.dwg		
<AUTO STAMP> NOT REQUIRED IF USING LATEST 2ND SHEETS	Date/File stamp	Annotation	Border Sheets	Second Sheets
		(custom lisp routine)		

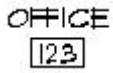
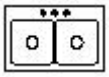
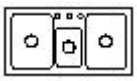
Symbol	Description	Symbol File Access		
		IM Group	IM Category	IM Topic
		Pathname		
	Form DSC-44	Annotation	Border Sheets	Second Sheets
		s:\std\gen\frmdsc44.dwg		
	Cover sheet border	Annotation	Border Sheets	Cover Sheets
		s:\std\gen\cvr2a.dwg		
	Design development approval block	Annotation	Border Sheets	Cover Sheets
		s:\sym\gen\cover\zab16dd.dwg		
	Construction drawing set approval block	Annotation	Border Sheets	Cover Sheets
		s:\sym\gen\cover\zab16cd.dwg		
	Revision block	Annotation	Border Sheets	Cover Sheets
		s:\sym\gen\cover\zrevis.dwg		
	Project arrow	Annotation	Border Sheets	Cover Sheets
		s:\sym\gen\cover\zproaro1.dwg		
	Target	Annotation	Miscellaneous	General/Common
		s:\sym\gen\target.dwg		
	Detail Title	Annotation	Miscellaneous	General/Common
		s:\sym\gen\title1.dwg		
	3/4" North Arrow	Annotation	North Arrows	General/Common
		s:\sym\gen\znorth.dwg		
	1/2" North Arrow	Annotation	North Arrows	General/Common
		s:\sym\gen\znorth5.dwg		
	Building Arrow	Annotation	North Arrows	General/Common
		(custom lisp routine)		

Symbol	Description	Symbol File Access		
		IM Group	IM Category	IM Topic
		Pathname		
	1/16" = 1'-0" bar scale	Annotation	Scales	Architectural
		s:\sym\gen\zsca1_16.dwg		
	1/8" = 1'-0" bar scale	Annotation	Scales	Architectural
		s:\sym\gen\zsca1_8.dwg		
	3/16" = 1'-0" bar scale	Annotation	Scales	Architectural
		s:\sym\gen\zsca3_16.dwg		
	1/4" = 1'-0" bar scale	Annotation	Scales	Architectural
		s:\sym\gen\zsca1_4.dwg		
	3/8" = 1'-0" bar scale	Annotation	Scales	Architectural
		s:\sym\gen\zsca3_8.dwg		
	1/2" = 1'-0" bar scale	Annotation	Scales	Architectural
		s:\sym\gen\zsca1_2.dwg		
	3/4" = 1'-0" bar scale	Annotation	Scales	Architectural
		s:\sym\gen\zsca3_4.dwg		
	1" = 1'-0" bar scale	Annotation	Scales	Architectural
		s:\sym\gen\zsca1.dwg		
	1-1/2" = 1'-0" bar scale	Annotation	Scales	Architectural
		s:\sym\gen\zsca11_2.dwg		
	3" = 1'-0" bar scale	Annotation	Scales	Architectural
		s:\sym\gen\zsca3.dwg		
	1/2" = 1" (half scale) bar scale	Annotation	Scales	Architectural
		s:\sym\gen\zscahlfi.dwg		
	1" = 1" (full scale) bar scale	Annotation	Scales	Architectural
		s:\sym\gen\zscafull.dwg		

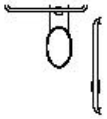
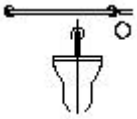
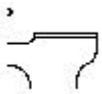
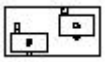
Symbol	Description	Symbol File Access		
		IM Group	IM Category	IM Topic
		Pathname		
	1" = 10' bar scale	Annotation	Scales	Engineering
		s:\sym\gen\zsca10.dwg		
	1" = 20' bar scale	Annotation	Scales	Engineering
		s:\sym\gen\zsca20.dwg		
	1" = 30' bar scale	Annotation	Scales	Engineering
		s:\sym\gen\zsca30.dwg		
	1" = 40' bar scale	Annotation	Scales	Engineering
		s:\sym\gen\zsca40.dwg		
	1" = 50' bar scale	Annotation	Scales	Engineering
		s:\sym\gen\zsca50.dwg		
	1" = 60' bar scale	Annotation	Scales	Engineering
		s:\sym\gen\zsca60.dwg		
	1" = 100' bar scale	Annotation	Scales	Engineering
		s:\sym\gen\zsca100.dwg		
	1" = 200' bar scale	Annotation	Scales	Engineering
		s:\sym\gen\zsca200.dwg		
	1:100 metric bar scale	Annotation	Scales	Metric
		s:\sym\gen\zscm100.dwg		
	1:125 metric bar scale	Annotation	Scales	Metric
		s:\sym\gen\zscm125.dwg		
	1:200 metric bar scale	Annotation	Scales	Metric
		s:\sym\gen\zscm200.dwg		
	1:250 metric bar scale	Annotation	Scales	Metric
		s:\sym\gen\zscm250.dwg		
	1:300 metric bar scale	Annotation	Scales	Metric
		s:\sym\gen\zscm300.dwg		

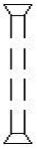
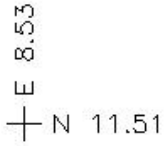
Symbol	Description	Symbol File Access		
		IM Group	IM Category	IM Topic
		Pathname		
	1:500 metric bar scale	Annotation	Scales	Metric
		s:\sym\gen\zscm500.dwg		
	1:1000 metric bar scale	Annotation	Scales	Metric
		s:\sym\gen\zscm1000.dwg		
	1:1250 metric bar scale	Annotation	Scales	Metric
		s:\sym\gen\zscm1250.dwg		
	1:1500 metric bar scale	Annotation	Scales	Metric
		s:\sym\gen\zscm1500.dwg		
	1:2000 metric bar scale	Annotation	Scales	Metric
		s:\sym\gen\zscm2000.dwg		
	1:2500 metric bar scale	Annotation	Scales	Metric
		s:\sym\gen\zscm2500.dwg		
	Label - Scale A	Annotation	Scales	Scale ID
		s:\sym\gen\zscalea.dwg		
	Label - Scale B	Annotation	Scales	Scale ID
		s:\sym\gen\zscaleb.dwg		
	Label - Scale C	Annotation	Scales	Scale ID
		s:\sym\gen\zscalec.dwg		
	Label - Scale D	Annotation	Scales	Scale ID
		s:\sym\gen\zscaled.dwg		
	Wood 1	Drawing Setup	Hatch Patterns	Architectural
		s:\support\wood1.pat		
	Wood 2	Drawing Setup	Hatch Patterns	Architectural
		s:\support\wood2.pat		

Symbol	Description	Symbol File Access		
		IM Group	IM Category	IM Topic
		Pathname		
	Wood 3	Drawing Setup	Hatch Patterns	Architectural
		s:\support\wood3.pat		
	Wood 4	Drawing Setup	Hatch Patterns	Architectural
		s:\support\wood4.pat		
	Wood 8	Drawing Setup	Hatch Patterns	Architectural
		s:\support\wood8.pat		
	Aggregate	Drawing Setup	Hatch Patterns	General/Common
		s:\support\aggregat.pat		
	Select backfill	Drawing Setup	Hatch Patterns	General/Common
		s:\support\sbackfil.pat		
	Gravel 1	Drawing Setup	Hatch Patterns	General/Common
		s:\support\gravel1.pat		
	Gravel 2	Drawing Setup	Hatch Patterns	General/Common
		s:\support\gravel2.pat		
	Gravel 3	Drawing Setup	Hatch Patterns	General/Common
		s:\support\gravel3.pat		
	Gravel 4	Drawing Setup	Hatch Patterns	General/Common
		s:\support\gravel4.pat		
	Batt insulation	Drawing Setup	Linetypes	Architectural
		s:\support\insul.lin		
	Door Label - Romans font	Symbols	Architectural	General/Common
		s:\sym\arch\adoorr.dwg		
	Door Label - Arch. font	Symbols	Architectural	General/Common
		s:\sym\arch\adoora.dwg		

Symbol	Description	Symbol File Access		
		IM Group	IM Category	IM Topic
		Pathname		
	Room Label - Romans font	Symbols	Architectural	General/Common
		s:\sym\arch\aroomr.dwg		
	Room Label - Arch. font	Symbols	Architectural	General/Common
		s:\sym\arch\arooma.dwg		
	Wall Label - Romans font	Symbols	Architectural	General/Common
		s:\sym\arch\awallr.dwg		
	Wall Label - Arch. font	Symbols	Architectural	General/Common
		s:\sym\arch\awalla.dwg		
	Window Label - Romans font	Symbols	Architectural	General/Common
		s:\sym\arch\awindr.dwg		
	Window Label - Arch. font	Symbols	Architectural	General/Common
		s:\sym\arch\awinda.dwg		
	Single lav - plan view	Symbols	Architectural	Plumbing Fixtures
		s:\sym\arch\alavp1.dwg		
	Round sink - plan view	Symbols	Architectural	Plumbing Fixtures
		s:\sym\arch\alavovp1.dwg		
	Single sink - plan view	Symbols	Architectural	Plumbing Fixtures
		s:\sym\arch\asink1p1.dwg		
	Double sink - plan view	Symbols	Architectural	Plumbing Fixtures
		s:\sym\arch\asink2p1.dwg		
	Triple sink - plan view	Symbols	Architectural	Plumbing Fixtures
		s:\sym\arch\asink3p1.dwg		
	Single lav - front view	Symbols	Architectural	Plumbing Fixtures
		s:\sym\arch\asink1f1.dwg		

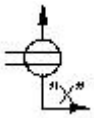
Symbol	Description	Symbol File Access		
		IM Group	IM Category	IM Topic
		Pathname		
	Oval sink - plan view	Symbols	Architectural	Plumbing Fixtures
		s:\sym\arch\alavovp2.dwg		
	Oval sink - front view	Symbols	Architectural	Plumbing Fixtures
		s:\sym\arch\alavovf1.dwg		
	Oval sink - side view	Symbols	Architectural	Plumbing Fixtures
		s:\sym\arch\alavovs1.dwg		
	Water closet #1 - plan view	Symbols	Architectural	Plumbing Fixtures
		s:\sym\arch\awcp1.dwg		
	Water closet #1 - front view	Symbols	Architectural	Plumbing Fixtures
		s:\sym\arch\awcf1.dwg		
	Water closet #1 - side view	Symbols	Architectural	Plumbing Fixtures
		s:\sym\arch\awcs1.dwg		
	Water closet #2 - plan view	Symbols	Architectural	Plumbing Fixtures
		s:\sym\arch\awcp2.dwg		
	Water closet #2 - front view	Symbols	Architectural	Plumbing Fixtures
		s:\sym\arch\awcf2.dwg		
	Water closet #2 - side view	Symbols	Architectural	Plumbing Fixtures
		s:\sym\arch\awcs2.dwg		
	Water closet #3 - plan view	Symbols	Architectural	Plumbing Fixtures
		s:\sym\arch\awcp3.dwg		
	Water closet #3 - front view	Symbols	Architectural	Plumbing Fixtures
		s:\sym\arch\awcf3.dwg		
	Water closet #3 - side view	Symbols	Architectural	Plumbing Fixtures
		s:\sym\arch\awcs3.dwg		

Symbol	Description	Symbol File Access		
		IM Group	IM Category	IM Topic
		Pathname		
	Urinal #1 - plan view	Symbols	Architectural	Plumbing Fixtures
		s:\sym\arch\aurnlp1.dwg		
	Urinal #1 - front view	Symbols	Architectural	Plumbing Fixtures
		s:\sym\arch\aurnlf1.dwg		
	Urinal #1 - side view	Symbols	Architectural	Plumbing Fixtures
		s:\sym\arch\aurnls1.dwg		
	Urinal #2 - plan view	Symbols	Architectural	Plumbing Fixtures
		s:\sym\arch\aurnlp2.dwg		
	Urinal #2 - front view	Symbols	Architectural	Plumbing Fixtures
		s:\sym\arch\aurnlf2.dwg		
	Urinal #2 - side view	Symbols	Architectural	Plumbing Fixtures
		s:\sym\arch\aurnls2.dwg		
	Water closet - handicap - plan view	Symbols	Architectural	Plumbing Fixtures
		s:\sym\arch\ahandp1.dwg		
	Water closet - handicap - front view	Symbols	Architectural	Plumbing Fixtures
		s:\sym\arch\ahandf1.dwg		
	Water closet - handicap - side view	Symbols	Architectural	Plumbing Fixtures
		s:\sym\arch\ahands2.dwg		
	Drinking fountains - plan view	Symbols	Architectural	Plumbing Fixtures
		s:\sym\arch\adrp1.dwg		
	Drinking fountains - front view	Symbols	Architectural	Plumbing Fixtures
		s:\sym\arch\adrf1.dwg		
	Culvert w/end sections - single line	Symbols	Civil	Drainage
		(custom lisp routine)		

Symbol	Description	Symbol File Access		
		IM Group	IM Category	IM Topic
		Pathname		
	Culvert w/mixed (headwall and end section - single line)	Symbols	Civil	Drainage
		(custom lisp routine)		
	Culvert w/wall (with headwall - single line)	Symbols	Civil	Drainage
		(custom lisp routine)		
	Culvert w/end (with end sections - dbl line)	Symbols	Civil	Drainage
		(custom lisp routine)		
	Culvert w/mixed (headwall and end sections - dbl line)	Symbols	Civil	Drainage
		(custom lisp routine)		
	Culvert w/wall (with headwall - dbl line)	Symbols	Civil	Drainage
		(custom lisp routine)		
	Benchmark	Symbols	Civil	General/Common
		s:\sym\civil\cbenmrk.dwg		
	Benchmark II	Symbols	Civil	General/Common
		s:\sym\civil\cbm2.dwg		
	Grid tick	Symbols	Civil	General/Common
		s:\sym\civil\cgridtck.dwg		
	Grid label	Symbols	Civil	General/Common
		s:\sym\civil\cgridlbl.dwg		
	Soil boring	Symbols	Civil	General/Common
		s:\sym\civil\boring.dwg		
	New cleanout	Symbols	Civil	Sewer
		s:\sym\civil\co.dwg		

Symbol	Description	Symbol File Access		
		IM Group	IM Category	IM Topic
		Pathname		
	Existing cleanout	Symbols	Civil	Sewer
		s:\sym\civil\coex.dwg		
	New manhole	Symbols	Civil	Sewer
		s:\sym\civil\mh.dwg		
	Existing manhole	Symbols	Civil	Sewer
		s:\sym\civil\mhex.dwg		
	Air relief valve	Symbols	Civil	Water
		s:\sym\civil\arv.dwg		
	New fire hydrant	Symbols	Civil	Water
		s:\sym\civil\hyd.dwg		
	Existing fire hydrant	Symbols	Civil	Water
		s:\sym\civil\hydex.dwg		
	Water meter	Symbols	Civil	Water
		s:\sym\civil\meter.dwg		
	New valve	Symbols	Civil	Water
		s:\sym\civil\valve.dwg		
	Existing valve	Symbols	Civil	Water
		s:\sym\civil\valveex.dwg		
	New yard hydrant	Symbols	Civil	Water
		s:\sym\civil\hydyd.dwg		
	Existing yard hydrant	Symbols	Civil	Water
		s:\sym\civil\hydydex.dwg		
	Pipe plug	Symbols	Civil	Water
		s:\sym\civil\cpipeend.dwg		

Symbol	Description	Symbol File Access		
		IM Group	IM Category	IM Topic
		Pathname		
	Screened end	Symbols	Civil	Water
		s:\sym\civil\cscrend.dwg		
	Computer outlet	Symbols	Electrical	Power
		s:\sym\elec\power\ecompout.dwg		
	Conduit up	Symbols	Electrical	Power
		s:\sym\elec\power\econdup.dwg		
	Conduit - down	Symbols	Electrical	Power
		s:\sym\elec\power\econddn.dwg		
	Data outlet	Symbols	Electrical	Power
		s:\sym\elec\power\edataout.dwg		
	Conduit cap	Symbols	Electrical	Power
		s:\sym\elec\power\ecap.dwg		
	Single receptacle	Symbols	Electrical	Power
		s:\sym\elec\power\esglrcpt.dwg		
	Duplex receptacle	Symbols	Electrical	Power
		s:\sym\elec\power\eduprcpt.dwg		
	Duplex receptacle - waterproof	Symbols	Electrical	Power
		s:\sym\elec\power\ercptwp.dwg		
	Floor mounted receptacle	Symbols	Electrical	Power
		s:\sym\elec\power\ercptfm.dwg		
	Duplex receptacle - split wired	Symbols	Electrical	Power
		s:\sym\elec\power\ercptsw.dwg		
	Duplex receptacle - isolated ground	Symbols	Electrical	Power
		s:\sym\elec\power\ercptig.dwg		

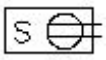
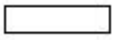
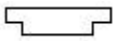
Symbol	Description	Symbol File Access		
		IM Group	IM Category	IM Topic
		Pathname		
	Duplex receptacle GFCI	Symbols	Electrical	Power
		s:\sym\elec\power\ercpgfci.dwg		
	Triplex receptacle	Symbols	Electrical	Power
		s:\sym\elec\power\ercpttri.dwg		
	Double duplex receptacle	Symbols	Electrical	Power
		s:\sym\elec\power\ercptdd.dwg		
	Floor receptacle - 2 inches from wall	Symbols	Electrical	Power
		s:\sym\elec\power\ercptflr.dwg		
	Double duplex receptacle - flush mounted	Symbols	Electrical	Power
		s:\sym\elec\power\ercpddfm.dwg		
	Double duplex receptacle - isolated ground	Symbols	Electrical	Power
		s:\sym\elec\power\ercptigd.dwg		
	Multi outlet assembly	Symbols	Electrical	Power
		s:\sym\elec\power\ercptmo.dwg		
	Cable TV outlet	Symbols	Electrical	Power
		s:\sym\elec\power\ectvout.dwg		
	Computer modem outlet	Symbols	Electrical	Power
		s:\sym\elec\power\emodout.dwg		
	Telephone outlet - floor mounted	Symbols	Electrical	Power
		s:\sym\elec\power\ephoutfm.dwg		
	Pay phone outlet	Symbols	Electrical	Power
		s:\sym\elec\power\ephoutpa.dwg		
	Recessed phone outlet	Symbols	Electrical	Power
		s:\sym\elec\power\ephoutr.dwg		

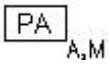
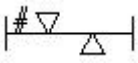
Symbol	Description	Symbol File Access		
		IM Group	IM Category	IM Topic
		Pathname		
	Surface mounted phone outlet	Symbols	Electrical	Power
		s:\sym\elec\power\ephoutsm.dwg		
	Meter	Symbols	Electrical	Power
		s:\sym\elec\power\emeter.dwg		
	Pullbox	Symbols	Electrical	Power
		s:\sym\elec\power\epullbox.dwg		
	Manhole	Symbols	Electrical	Power
		s:\sym\elec\power\emanhole.dwg		
	Splice box	Symbols	Electrical	Power
		s:\sym\elec\power\esplbox.dwg		
	Pad transformer	Symbols	Electrical	Power
		s:\sym\elec\power\epadtr.dwg		
	Pole transformer	Symbols	Electrical	Power
		s:\sym\elec\power\epoletr.dwg		
	Combination alarm panel	Symbols	Electrical	Power
		s:\sym\elec\power\efireint.dwg		
	Intrusion alarm	Symbols	Electrical	Power
		s:\sym\elec\power\eintpnl.dwg		
	Fire alarm panel	Symbols	Electrical	Power
		s:\sym\elec\power\efirepnl.dwg		
	Intrusion detector	Symbols	Electrical	Power
		s:\sym\elec\power\eintdet.dwg		
	Fire detector	Symbols	Electrical	Power
		s:\sym\elec\power\efiredet.dwg		

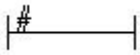
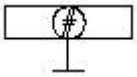
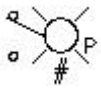
Symbol	Description	Symbol File Access		
		IM Group	IM Category	IM Topic
		Pathname		
	Flow switch	Symbols	Electrical	Power
		s:\sym\elec\power\eflowsw.dwg		
	Tamper switch	Symbols	Electrical	Power
		s:\sym\elec\power\etampsw.dwg		
	Manual pull station	Symbols	Electrical	Power
		s:\sym\elec\power\emanps.dwg		
	Fire/intrusion horn	Symbols	Electrical	Power
		s:\sym\elec\power\ehorn.dwg		
	Bell	Symbols	Electrical	Power
		s:\sym\elec\power\ebell.dwg		
	Magnetic switch	Symbols	Electrical	Power
		s:\sym\elec\power\emagsw.dwg		
	Keypad	Symbols	Electrical	Power
		s:\sym\elec\power\ekeypad.dwg		
	Annunciator	Symbols	Electrical	Power
		s:\sym\elec\power\eannpnl.dwg		
	Auto phone dialer	Symbols	Electrical	Power
		s:\sym\elec\power\eautopd.dwg		
	Magnetic door holder	Symbols	Electrical	Power
		s:\sym\elec\power\emagdoor.dwg		
	EOL device	Symbols	Electrical	Power
		s:\sym\elec\power\eeoldev.dwg		
	Closed circuit TV	Symbols	Electrical	Power
		s:\sym\elec\power\ecctv.dwg		

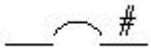
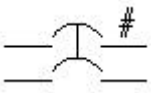
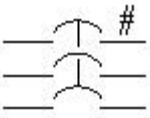
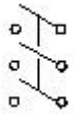
Symbol	Description	Symbol File Access		
		IM Group	IM Category	IM Topic
		Pathname		
	Meter socket	Symbols	Electrical	Power
		s:\sym\elec\power\emtrsock.dwg		
	Pushbutton	Symbols	Electrical	Power
		s:\sym\elec\power\epb.dwg		
	Door buzzer	Symbols	Electrical	Power
		s:\sym\elec\power\ebuzz.dwg		
	Hand dryer	Symbols	Electrical	Power
		s:\sym\elec\power\ehd.dwg		
	Electric heater	Symbols	Electrical	Power
		s:\sym\elec\power\eeh.dwg		
	Drinking fountain	Symbols	Electrical	Power
		s:\sym\elec\power\edf.dwg		
	CO sensor	Symbols	Electrical	Power
		s:\sym\elec\power\eco.dwg		
	Radon sensor	Symbols	Electrical	Power
		s:\sym\elec\power\ers.dwg		
	Uninterruptable power supply	Symbols	Electrical	Power
		s:\sym\elec\power\eups.dwg		
	Programmable lighting controller	Symbols	Electrical	Power
		s:\sym\elec\power\eplc.dwg		
	PA system	Symbols	Electrical	Power
		s:\sym\elec\power\epa.dwg		
	Duplex pump controller	Symbols	Electrical	Power
		s:\sym\elec\power\edcp.dwg		

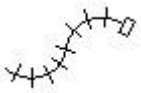
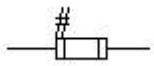
Symbol	Description	Symbol File Access		
		IM Group	IM Category	IM Topic
		Pathname		
	Motor	Symbols	Electrical	Power
		s:\sym\elec\power\emotor.dwg		
	Control relay coil	Symbols	Electrical	Power
		s:\sym\elec\power\ecr.dwg		
	Duct heater	Symbols	Electrical	Power
		s:\sym\elec\power\edh.dwg		
	Occupancy sensor	Symbols	Electrical	Power
		s:\sym\elec\power\eos.dwg		
	Photo cell relay	Symbols	Electrical	Power
		s:\sym\elec\power\epc.dwg		
	Time switch	Symbols	Electrical	Power
		s:\sym\elec\power\ets.dwg		
	Auxiliary relay	Symbols	Electrical	Power
		s:\sym\elec\power\ear.dwg		
	Protective relay	Symbols	Electrical	Power
		s:\sym\elec\power\epr.dwg		
	Undervoltage	Symbols	Electrical	Power
		s:\sym\elec\power\euv.dwg		
	Primary coil	Symbols	Electrical	Power
		s:\sym\elec\power\epcoil.dwg		
	Secondary coil	Symbols	Electrical	Power
		s:\sym\elec\power\eseccoil.dwg		
	Thermostat	Symbols	Electrical	Power
		s:\sym\elec\power\ethermo.dwg		

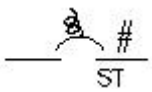
Symbol	Description	Symbol File Access		
		IM Group	IM Category	IM Topic
		Pathname		
	Humidistat	Symbols	Electrical	Power
		s:\sym\elec\power\ehstat.dwg		
	Generator	Symbols	Electrical	Power
		s:\sym\elec\power\egen.dwg		
	Special purpose receptacle	Symbols	Electrical	Power
		s:\sym\elec\power\especial.dwg		
	Single pole switch	Symbols	Electrical	Power
		s:\sym\elec\power\espsw.dwg		
	Unit type switch	Symbols	Electrical	Power
		s:\sym\elec\power\esw-unit.dwg		
	Switch and receptacle combo	Symbols	Electrical	Power
		s:\sym\elec\power\esrcombo.dwg		
	Junction box	Symbols	Electrical	Power
		s:\sym\elec\power\ejbox.dwg		
	Time delay relay	Symbols	Electrical	Power
		s:\sym\elec\power\etdrel.dwg		
	Enclosure - surface mounted	Symbols	Electrical	Power
		s:\sym\elec\power\eencl-sm.dwg		
	Enclosure - flush mounted	Symbols	Electrical	Power
		s:\sym\elec\power\eencl-fm.dwg		
	Panelboard - surface mounted	Symbols	Electrical	Power
		s:\sym\elec\power\epnlbdsm.dwg		
	Panelboard - flush mounted	Symbols	Electrical	Power
		s:\sym\elec\power\epnlbdfm.dwg		

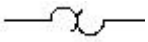
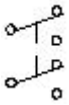
Symbol	Description	Symbol File Access		
		IM Group	IM Category	IM Topic
		Pathname		
	Motor control center	Symbols	Electrical	Power
		s:\sym\elec\power\emcc.dwg		
	Disconnect switch	Symbols	Electrical	Power
		s:\sym\elec\power\ediscon.dwg		
	Motor starter	Symbols	Electrical	Power
		s:\sym\elec\power\emstart.dwg		
	Starter and disconnect means	Symbols	Electrical	Power
		s:\sym\elec\power\ecombosd.dwg		
	Telephone terminal board	Symbols	Electrical	Power
		s:\sym\elec\power\ettb.dwg		
	Speaker	Symbols	Electrical	Power
		s:\sym\elec\power\espkr.dwg		
	PA System	Symbols	Electrical	Power
		s:\sym\elec\power\epas.dwg		
	Temperature control panel	Symbols	Electrical	Power
		s:\sym\elec\power\etcp.dwg		
	Solenoid valve	Symbols	Electrical	Power
		s:\sym\elec\power\esolnoid.dwg		
	Radiant heater panel	Symbols	Electrical	Power
		s:\sym\elec\power\erhp.dwg		
	Air handler unit	Symbols	Electrical	Power
		s:\sym\elec\power\eahu.dwg		
	Track light	Symbols	Electrical	Lighting
		s:\sym\elec\lighting\etracklt.dwg		

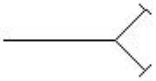
Symbol	Description	Symbol File Access		
		IM Group	IM Category	IM Topic
		Pathname		
	Strip light	Symbols	Electrical	Lighting
		s:\sym\elec\lighting\estriplt.dwg		
	Emergency fluorescent	Symbols	Electrical	Lighting
		s:\sym\elec\lighting\eemerflr.dwg		
	Fluorescent - wall mount	Symbols	Electrical	Lighting
		s:\sym\elec\lighting\eltflrwm.dwg		
	Continuous row fluorescent - surface or pendant mounted	Symbols	Electrical	Lighting
		s:\sym\elec\lighting\econtrow.dwg		
	Light fixture	Symbols	Electrical	Lighting
		s:\sym\elec\lighting\elight.dwg		
	Light fixture - wall mounted	Symbols	Electrical	Lighting
		s:\sym\elec\lighting\elightwm.dwg		
	Fluorescent - ceiling mounted	Symbols	Electrical	Lighting
		s:\sym\elec\lighting\elightcm.dwg		
	Pilot light	Symbols	Electrical	Lighting
		s:\sym\elec\lighting\epilotlt.dwg		
	Exit light	Symbols	Electrical	Lighting
		s:\sym\elec\lighting\eexit.dwg		
	Emergency lighting converter	Symbols	Electrical	Lighting
		s:\sym\elec\lighting\econv.dwg		
	Connection	Symbols	Electrical	Controls
		s:\sym\elec\controls\econn.dwg		
	Separable connector	Symbols	Electrical	Controls
		s:\sym\elec\controls\esepconn.dwg		

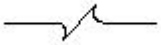
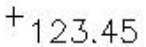
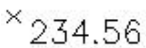
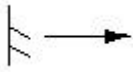
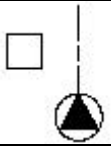
Symbol	Description	Symbol File Access		
		IM Group	IM Category	IM Topic
		Pathname		
	Terminal block	Symbols	Electrical	Controls
		s:\sym\elec\controls\etb.dwg		
	Connection from external equipment	Symbols	Electrical	Controls
		s:\sym\elec\controls\eextconn.dwg		
	Electrical contacts, N.O.	Symbols	Electrical	Controls
		s:\sym\elec\controls\enocont.dwg		
	Electrical contacts, N.C.	Symbols	Electrical	Controls
		s:\sym\elec\controls\enccont.dwg		
	Current transformer	Symbols	Electrical	Controls
		s:\sym\elec\controls\ectrans.dwg		
	Potential transformer	Symbols	Electrical	Controls
		s:\sym\elec\controls\eptrans.dwg		
	Transformer	Symbols	Electrical	Controls
		s:\sym\elec\controls\etrans.dwg		
	Electrical device - function as noted	Symbols	Electrical	Controls
		s:\sym\elec\controls\eelecdev.dwg		
	1 Pole circuit breaker	Symbols	Electrical	Controls
		s:\sym\elec\controls\e1p-cb.dwg		
	2 Pole circuit breaker	Symbols	Electrical	Controls
		s:\sym\elec\controls\e2p-cb.dwg		
	3 Pole circuit breaker	Symbols	Electrical	Controls
		s:\sym\elec\controls\e3p-cb.dwg		
	3 Pole - single throw	Symbols	Electrical	Controls
		s:\sym\elec\controls\e3pole.dwg		

Symbol	Description	Symbol File Access		
		IM Group	IM Category	IM Topic
		Pathname		
	Battery	Symbols	Electrical	Controls
		s:\sym\elec\controls\ebattery.dwg		
	Bayonet fuse	Symbols	Electrical	Controls
		s:\sym\elec\controls\ebayfs.dwg		
	Conduit seal (explosion proof)	Symbols	Electrical	Controls
		s:\sym\elec\controls\esealep.dwg		
	Flow actuated sw (closes on increasing flow)	Symbols	Electrical	Controls
		s:\sym\elec\controls\eflwclos.dwg		
	Flow actuated switch (opens on increasing flow)	Symbols	Electrical	Controls
		s:\sym\elec\controls\eflwopen.dwg		
	Flexible conduit	Symbols	Electrical	Controls
		s:\sym\elec\controls\eflxcond.dwg		
	Fused switch - open	Symbols	Electrical	Controls
		s:\sym\elec\controls\efsopen.dwg		
	Fuse (general)	Symbols	Electrical	Controls
		s:\sym\elec\controls\efuse.dwg		
	Fuse	Symbols	Electrical	Controls
		s:\sym\elec\controls\efusesz.dwg		
	Ground	Symbols	Electrical	Controls
		s:\sym\elec\controls\eground.dwg		
	Latching relay	Symbols	Electrical	Controls
		s:\sym\elec\controls\elatch.dwg		
	Liquid level actuated switch, closes on rising level	Symbols	Electrical	Controls
		s:\sym\elec\controls\ellclose.dwg		

Symbol	Description	Symbol File Access		
		IM Group	IM Category	IM Topic
		Pathname		
	Liquid level actuated switch, opens on rising level	Symbols	Electrical	Controls
		s:\sym\elec\controls\ellopen.dwg		
	Meter instrument	Symbols	Electrical	Controls
		s:\sym\elec\controls\emeter.dwg		
	Time delay - closes on deactivation	Symbols	Electrical	Controls
		s:\sym\elec\controls\enctd.dwg		
	Time delay - opens on deactivation	Symbols	Electrical	Controls
		s:\sym\elec\controls\enotd.dwg		
	Time delay - N.C. - closing on deactivation	Symbols	Electrical	Controls
		s:\sym\elec\controls\enctdact.dwg		
	Time delay - N.O. - opening on deactivation	Symbols	Electrical	Controls
		s:\sym\elec\controls\enotdact.dwg		
	Cord and plug	Symbols	Electrical	Controls
		s:\sym\elec\controls\eplug.dwg		
	Pressure or vacuum actuated switch - closes on rising pressure	Symbols	Electrical	Controls
		s:\sym\elec\controls\epropen.dwg		
	Pressure or vacuum actuated switch - opens on rising pressure	Symbols	Electrical	Controls
		s:\sym\elec\controls\eprclose.dwg		
	Probe	Symbols	Electrical	Controls
		s:\sym\elec\controls\eprobe.dwg		
	Shunt trip circuit	Symbols	Electrical	Controls
		s:\sym\elec\controls\eshuntcb.dwg		
	Lightning arrestor	Symbols	Electrical	Controls
		s:\sym\elec\controls\esurge.dwg		

Symbol	Description	Symbol File Access		
		IM Group	IM Category	IM Topic
		Pathname		
	Transfer switch	Symbols	Electrical	Controls
		s:\sym\elec\controls\etrsw.dwg		
	Thermal element - motor overload	Symbols	Electrical	Controls
		s:\sym\elec\controls\ethermal.dwg		
	Temperature actuated switch - opens on falling temperature	Symbols	Electrical	Controls
		s:\sym\elec\controls\etfall.dwg		
	Temperature actuated switch - opens on rising temperature	Symbols	Electrical	Controls
		s:\sym\elec\controls\etrise.dwg		
	Switch, SPST	Symbols	Electrical	Controls
		s:\sym\elec\controls\esw-spst.dwg		
	Switch, SPDT	Symbols	Electrical	Controls
		s:\sym\elec\controls\esw-spdt.dwg		
	Switch, DPST	Symbols	Electrical	Controls
		s:\sym\elec\controls\esw-dpst.dwg		
	Switch, DPDT	Symbols	Electrical	Controls
		s:\sym\elec\controls\esw-dpdt.dwg		
	3-Phase delta	Symbols	Electrical	Controls
		s:\sym\elec\controls\edelta.dwg		
	3-Phase grounded wye	Symbols	Electrical	Controls
		s:\sym\elec\controls\ewye.dwg		
	Multi position switch	Symbols	Electrical	Controls
		s:\sym\elec\controls\emulti.dwg		
	N.C. Pushbutton	Symbols	Electrical	Controls
		s:\sym\elec\controls\encpb.dwg		

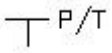
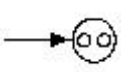
Symbol	Description	Symbol File Access		
		IM Group	IM Category	IM Topic
		Pathname		
	N.O. Pushbutton	Symbols	Electrical	Controls
		s:\sym\elec\controls\enopb.dwg		
	N.C. Limit switch	Symbols	Electrical	Controls
		s:\sym\elec\controls\enclsw.dwg		
	N.O. Limit switch	Symbols	Electrical	Controls
		s:\sym\elec\controls\enolsw.dwg		
	Upright Sprinkler	Symbols	Fire	Sprinkler Systems (piping)
		s:\sym\fire\f-upspr.dwg		
	Pendant Sprinkler	Symbols	Fire	Sprinkler Systems (piping)
		s:\sym\fire\f-penspr.dwg		
	Sprinkler guard	Symbols	Fire	Sprinkler Systems (piping)
		s:\sym\fire\f-sprgrd.dwg		
	Dry pendant	Symbols	Fire	Sprinkler Systems (piping)
		s:\sym\fire\f-drypen.dwg		
	Sidewall sprinkler	Symbols	Fire	Sprinkler Systems (piping)
		s:\sym\fire\f-sidewl.dwg		
	Alarm check valve	Symbols	Fire	Sprinkler Systems (piping)
		s:\sym\fire\f-alarm.dwg		
	Dry pipe valve	Symbols	Fire	Sprinkler Systems (piping)
		s:\sym\fire\f-drypip.dwg		
	Fire Department connection	Symbols	Fire	Sprinkler Systems (piping)
		s:\sym\fire\f-conn.dwg		
	Break line (straight)	Symbols	General	(No Topic)
		(custom lisp routine)		

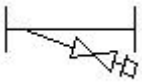
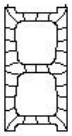
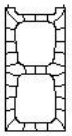
Symbol	Description	Symbol File Access		
		IM Group	IM Category	IM Topic
		Pathname		
	Break line (arc)	Symbols	General	(No Topic)
		(custom lisp routine)		
	Spot elevation	Symbols	General	(No Topic)
		s:\sym\gen\spotel_1.dwg		
	Existing spot elevation	Symbols	General	(No Topic)
		s:\sym\gen\spotelx1.dwg		
	Auto damper	Symbols	Mechanical	HVAC
		s:\sym\mech\madamp.dwg		
	Backdraft damper	Symbols	Mechanical	HVAC
		s:\sym\mech\mbkdrft.dwg		
	Fire damper w/door	Symbols	Mechanical	HVAC
		s:\sym\mech\mfired1.dwg		
	Fire damper	Symbols	Mechanical	HVAC
		s:\sym\mech\mfired2.dwg		
	Flexible duct connector	Symbols	Mechanical	HVAC
		s:\sym\mech\mflxcon.dwg		
	Humidistat	Symbols	Mechanical	HVAC
		s:\sym\mech\mhumid.dwg		
	Volume damper	Symbols	Mechanical	HVAC
		s:\sym\mech\mmdamp.dwg		
	Smoke detector	Symbols	Mechanical	HVAC
		s:\sym\mech\msmkdet.dwg		
	Temperature sensor	Symbols	Mechanical	HVAC
		s:\sym\mech\mtsens.dwg		

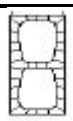
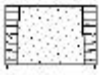
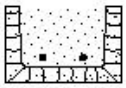
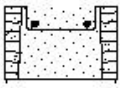
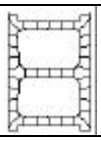
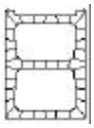
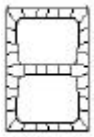
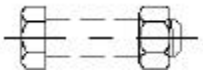
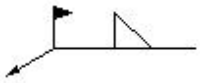
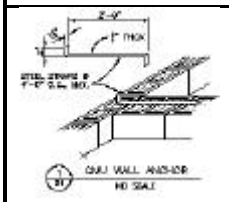
Symbol	Description	Symbol File Access		
		IM Group	IM Category	IM Topic
		Pathname		
	Thermostat	Symbols	Mechanical	HVAC
		s:\sym\mech\mtstat.dwg		
	Pipe break - single line pipe	Symbols	Plumbing	(No Topic)
		s:\sym\plumb\pipebr1.dwg		
	Pipe break - double line pipe	Symbols	Plumbing	(No Topic)
		s:\sym\plumb\pipebr2.dwg		
	Pipe cap	Symbols	Plumbing	(No Topic)
		s:\sym\plumb\pcap.dwg		
	Cleanout	Symbols	Plumbing	(No Topic)
		s:\sym\plumb\pco.dwg		
	Wall cleanout	Symbols	Plumbing	(No Topic)
		s:\sym\plumb\pwco.dwg		
	Floor cleanout	Symbols	Plumbing	(No Topic)
		s:\sym\plumb\pfco.dwg		
	Grade cleanout	Symbols	Plumbing	(No Topic)
		s:\sym\plumb\pgco.dwg		
	Floor drain	Symbols	Plumbing	(No Topic)
		s:\sym\plumb\pfd.dwg		
	Elbow tee	Symbols	Plumbing	(No Topic)
		s:\sym\plumb\psgl-tee.dwg		
	Elbow base	Symbols	Plumbing	(No Topic)
		s:\sym\plumb\pel-base.dwg		
	Expansion joint	Symbols	Plumbing	(No Topic)
		s:\sym\plumb\pexp-jt.dwg		

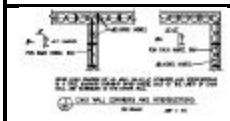
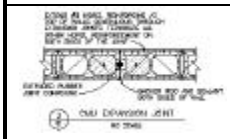
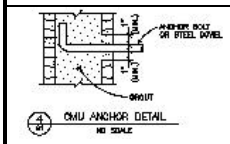
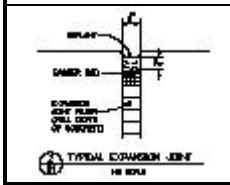
Symbol	Description	Symbol File Access		
		IM Group	IM Category	IM Topic
		Pathname		
	Flex connector	Symbols	Plumbing	(No Topic)
		s:\sym\plumb\pflex.dwg		
	2-way auto	Symbols	Plumbing	(No Topic)
		s:\sym\plumb\p2way.dwg		
	3-way auto	Symbols	Plumbing	(No Topic)
		s:\sym\plumb\p3way.dwg		
	Angle gate valve	Symbols	Plumbing	(No Topic)
		s:\sym\plumb\pagate.dwg		
	Angle gate valve - plan view	Symbols	Plumbing	(No Topic)
		s:\sym\plumb\pagatepl.dwg		
	Angle globe valve	Symbols	Plumbing	(No Topic)
		s:\sym\plumb\paglobe.dwg		
	Angle globe valve - plan view	Symbols	Plumbing	(No Topic)
		s:\sym\plumb\paglpl.dwg		
	Air separator	Symbols	Plumbing	(No Topic)
		s:\sym\plumb\pair-sep.dwg		
	Air vent	Symbols	Plumbing	(No Topic)
		s:\sym\plumb\pav.dwg		
	Ball valve	Symbols	Plumbing	(No Topic)
		s:\sym\plumb\pball1.dwg		
	Ball valve	Symbols	Plumbing	(No Topic)
		s:\sym\plumb\pball2.dwg		
	Balancing valve	Symbols	Plumbing	(No Topic)
		s:\sym\plumb\pbalnce.dwg		

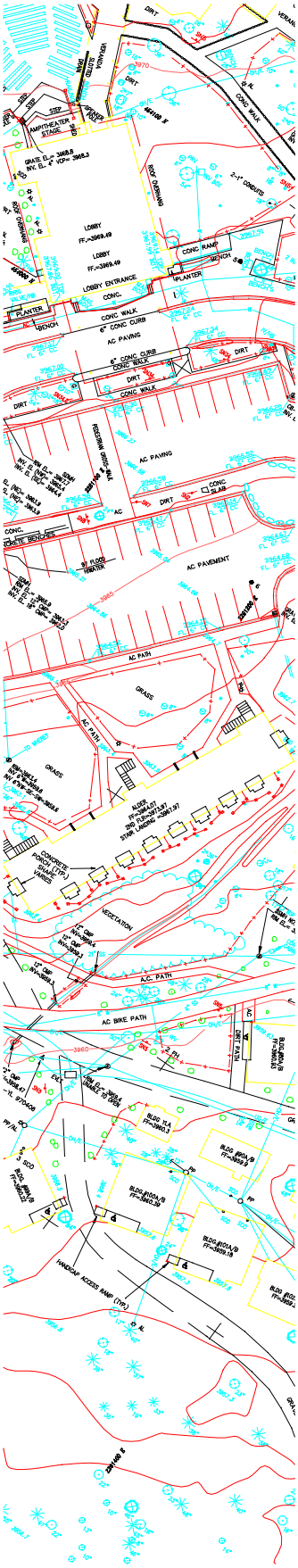
Symbol	Description	Symbol File Access		
		IM Group	IM Category	IM Topic
		Pathname		
	Backflow preventer	Symbols	Plumbing	(No Topic)
		s:\sym\plumb\pbfp.dwg		
	Butterfly valve	Symbols	Plumbing	(No Topic)
		s:\sym\plumb\pbtrfly.dwg		
	Check valve	Symbols	Plumbing	(No Topic)
		s:\sym\plumb\pcheck.dwg		
	Concentric reducer	Symbols	Plumbing	(No Topic)
		s:\sym\plumb\pcon-red.dwg		
	Eccentric reducer	Symbols	Plumbing	(No Topic)
		s:\sym\plumb\pecc-red.dwg		
	Flow meter	Symbols	Plumbing	(No Topic)
		s:\sym\plumb\pflo-mtr.dwg		
	Flow switch	Symbols	Plumbing	(No Topic)
		s:\sym\plumb\pflow-sw.dwg		
	Fluid meter	Symbols	Plumbing	(No Topic)
		s:\sym\plumb\pflu-mtr.dwg		
	Funnel drain	Symbols	Plumbing	(No Topic)
		s:\sym\plumb\pfnl-dr.dwg		
	Gate valve	Symbols	Plumbing	(No Topic)
		s:\sym\plumb\pgate.dwg		
	Globe valve	Symbols	Plumbing	(No Topic)
		s:\sym\plumb\pglobe.dwg		
	Hose bibb	Symbols	Plumbing	(No Topic)
		s:\sym\plumb\phb.dwg		

Symbol	Description	Symbol File Access		
		IM Group	IM Category	IM Topic
		Pathname		
	Hose connection	Symbols	Plumbing	(No Topic)
		s:\sym\plumb\phc.dwg		
	Manual air vent	Symbols	Plumbing	(No Topic)
		s:\sym\plumb\pmv.dwg		
	Orifice plate	Symbols	Plumbing	(No Topic)
		s:\sym\plumb\pori-pl.dwg		
	Plug valve	Symbols	Plumbing	(No Topic)
		s:\sym\plumb\pplug.dwg		
	Pressure reducing valve	Symbols	Plumbing	(No Topic)
		s:\sym\plumb\ppr-rdc.dwg		
	Pressure switch	Symbols	Plumbing	(No Topic)
		s:\sym\plumb\ppr-sw.dwg		
	Pressure gauge	Symbols	Plumbing	(No Topic)
		s:\sym\plumb\pprgage.dwg		
	Pressure and temperature tap	Symbols	Plumbing	(No Topic)
		s:\sym\plumb\pprtap.dwg		
	Pump	Symbols	Plumbing	(No Topic)
		s:\sym\plumb\ppump.dwg		
	Relief valve	Symbols	Plumbing	(No Topic)
		s:\sym\plumb\prelief.dwg		
	Shock arrestor	Symbols	Plumbing	(No Topic)
		s:\sym\plumb\psa.dwg		
	Sight glass	Symbols	Plumbing	(No Topic)
		s:\sym\plumb\psitegl.dwg		

Symbol	Description	Symbol File Access		
		IM Group	IM Category	IM Topic
		Pathname		
	Stem and yoke	Symbols	Plumbing	(No Topic)
		s:\sym\plumb\pst-yk.dwg		
	Stem and yoke w/tamper switch	Symbols	Plumbing	(No Topic)
		s:\sym\plumb\pst-ysts.dwg		
	Strainer w/blowdown and hose connection	Symbols	Plumbing	(No Topic)
		s:\sym\plumb\pstrain.dwg		
	Thermal bulb	Symbols	Plumbing	(No Topic)
		s:\sym\plumb\pth-bulb.dwg		
	Thermometer	Symbols	Plumbing	(No Topic)
		s:\sym\plumb\ptherm.dwg		
	Pipe union	Symbols	Plumbing	(No Topic)
		s:\sym\plumb\punion.dwg		
	Wall hydrant	Symbols	Plumbing	(No Topic)
		s:\sym\plumb\pwh.dwg		
	8x8 CMU	Symbols	Structural	CMU Masonry
		s:\sym\struc\8x8cmu.dwg		
	8 in. CMU lintel	Symbols	Structural	CMU Masonry
		s:\sym\struc\8xlintel.dwg		
	8x8 Bond beam	Symbols	Structural	CMU Masonry
		s:\sym\struc\8x8bbeam.dwg		
	8x16 Stretcher	Symbols	Structural	CMU Masonry
		s:\sym\struc\8x16.dwg		
	8x16 - 1 plain end	Symbols	Structural	CMU Masonry
		s:\sym\struc\8x16_1.dwg		

Symbol	Description	Symbol File Access		
		IM Group	IM Category	IM Topic
		Pathname		
	8x16 - 2 plain ends	Symbols	Structural	CMU Masonry
		s:\sym\struc\8x16_2.dwg		
	12x8 CMU	Symbols	Structural	CMU Masonry
		s:\sym\struc\12x8cmu.dwg		
	12 in. CMU lintel	Symbols	Structural	CMU Masonry
		s:\sym\struc\12xlintl.dwg		
	12x8 Bond beam	Symbols	Structural	CMU Masonry
		s:\sym\struc\12x8bbm.dwg		
	12x16 stretcher	Symbols	Structural	CMU Masonry
		s:\sym\struc\12x16.dwg		
	12x16 - 1 plain end	Symbols	Structural	CMU Masonry
		s:\sym\struc\12x16_1.dwg		
	12x16 - w plain ends	Symbols	Structural	CMU Masonry
		s:\sym\struc\12x16_2.dwg		
	Bolt	Symbols	Structural	Fasteners
		s:\sym\struc\zboltnut.dwg		
	Nut - plan	Symbols	Structural	Fasteners
		s:\sym\struc\znut.dwg		
	Weld symbols	Symbols	Structural	Fasteners
		(Dialogue Box for weld symbols)		
	Wall anchor	Standard Details	Structural	Masonry
		s:\std\struc\wlanchor.dwg		

Symbol	Description	Symbol File Access		
		IM Group	IM Category	IM Topic
		Pathname		
	CMU Wall int.	Standard Details	Structural	Masonry
		s:\std\struc\cmuwlint.dwg		
	CMU Exp. joint	Standard Details	Structural	Masonry
		s:\std\struc\cmuexpjt.dwg		
	Anchor Details	Standard Details	Structural	Masonry
		s:\std\struc\masancdt.dwg		
	Expansion joint	Standard Details	Structural	Concrete
		s:\std\struc\conexpjt.dwg		



Appendix F

Text Height vs. Plotting Height

Appendix F
Text Height vs. Plotting Height
(Relative to Model Space)

When Model Space Drawing Unit = 1 Inch

		Text Height:						
Plot Scale	**PS Zoom XP**	**.100**	**.130**	**.140**	**.175**	**.240**	**.500**	**Multiplier**
Full	1	. 100	.130	.140	.175	.240	.500	1.00
Half	1/2	.200	.260	.280	.350	.480	1.00	2.00
3"=1'	1/4	.400	.520	.560	.700	.960	2.00	4.00
1 1/2"=1'	1/8	.800	1.04	1.12	1.40	1.92	4.00	8.00
1"=1'	1/12	1.20	1.56	1.68	2.10	2.88	6.00	12.0
3/4"=1'	1/16	1.60	2.08	2.24	2.80	3.84	8.00	16.0
1/2"=1'	1/24	2.40	3.12	3.36	4.20	5.76	12.0	24.0
3/8"=1'	1/32	3.20	4.16	4.48	5.60	7.68	16.0	32.0
1/4"=1'	1/48	4.80	6.24	6.72	8.40	11.52	24.0	48.0
3/16"=1'	1/64	6.40	8.32	8.96	11.2	15.36	32.0	64.0
1/8"=1'	1/96	9.60	12.48	13.44	16.8	23.04	48.0	96.0
3/32"=1'	1/128	12.8	16.64	17.92	22.4	30.72	64.0	128
1/16"=1'	1/192	19.2	24.96	26.88	33.6	46.08	96.0	192

When Model Space Drawing Unit = 1 Foot

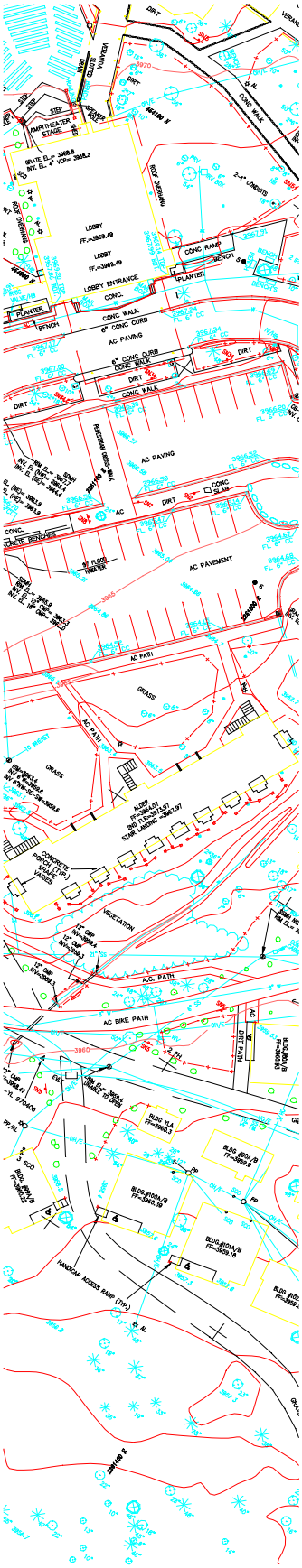
		Text Height:						
Plot Scale	**PS Zoom XP**	**.100**	**.130**	**.140**	**.175**	**.240**	**.500**	**Multiplier**
Full	12	.0083	.0108	.0117	.0146	.02	.0417	.0833
Half	6	.0167	.0217	.0233	.0292	.04	.0833	.1667
1"=10'	1/10	1	1.3	1.4	1.75	2.4	5	10
1"=20'	1/20	2	2.6	2.8	3.5	4.8	10	20
1"=25'	1/25	2.5	3.25	3.5	4.375	6	12.5	25
1"=30'	1/30	3	3.9	4.2	5.25	7.2	15	30
1"=40'	1/40	4	5.2	5.6	7	9.6	20	40
1"=50'	1/50	5	6.5	7	8.75	12	25	50
1"=60'	1/60	6	7.8	8.4	1.5	14.4	30	60
1"=100'	1/100	10	13	14	17.5	24	50	100

Larger scales when Model Space drawing unit = 1 Foot

		Text Height:						
Plot Scale	**PS Zoom XP**	**.100**	**.130**	**.140**	**.175**	**.240**	**.500**	**Multiplier**
1"=200'	1/200	20	26	28	35	48	100	200
1"=300'	1/300	30	39	42	52.5	72	150	300
1"=400'	1/400	40	52	56	70	96	200	400
1"=500'	1/500	50	65	70	87.5	120	250	500
1"=750'	1/750	75	97.5	105	131.25	180	375	750
1"=1000'	1/1000	100	130	140	175	240	500	1000
1"=2000'	1/2000	200	260	280	350	480	1000	2000
1"=2500'	1/2500	250	325	350	437.5	600	1250	2500
1"=3000'	1/3000	300	390	420	525	720	1500	3000
1"=4000'	1/4000	400	520	560	700	960	2000	4000

Model Space drawing unit = 1 Mile

		Text Height:						
Plot Scale	**PS Zoom XP**	**.100**	**.130**	**.140**	**.175**	**.240**	**.500**	**Multiplier**
1"=1mi	1	.1	.13	.14	.175	.24	.5	1
1"=2mi	1/2	.2	.26	.28	.35	.48	1	2
1"=3mi	1/3	.3	.39	.42	.525	.72	1.5	3
1"=4mi	1/4	.4	.52	.56	.7	.96	2	4
1"=5mi	1/5	.5	.65	.7	.875	1.2	2.5	5
1"=6mi	1/6	.6	.78	.84	1.05	1.44	3	6
1"=7mi	1/7	.7	.91	.98	1.225	1.68	3.5	7
1"=8mi	1/8	.8	1.04	1.12	1.4	1.92	4	8



Appendix G

DSC Keyboard Aliases

Appendix G
DSC Keyboard Aliases

Command	Alias
ARC	A
ARRAY	AR
BLOCK	BL
BREAK	B
Contruction lines:	
Erase	CE
X axis	CX
Y axis	CY
X & Y axis	CXY
CHANGE	CH
CIRCLE	C
COLOR	CL
COPY	CP
DDATTE	DDA
DDCHANGE	DDC
DDEDIT	DDE
DDINSERT	DDI
DDLTYPE	DDL
DDMODIFY	DDM
DDSTYLE	DDS
DISTANCE	DS
DTEXT	DT
DVIEW	DV
ELLIPSE	ES
ERASE	E
ERASE LAST	EL
EXPLODE	X
EXTEND	EX
FILLET	F
FILLET RAD. 0	F0
GROUP	G
INSERT	I
LAYER	LA
More layer stuff:	
SET (by pick)	LS
ON	LO
OFF (by pick)	LF
LOCK (by pick)	LL
UNLOCK (pick)	LU
EXCLUSIVE UNLOCK (by pick)	LEU
EXCLUSIVE ON (by pick)	LEO

Command	Alias
LEADER	LE
LENGTHEN	LG
LINE	L
LINETYPE	LT
LIST	LI
MOVE	M
MIRROR	MR
MSPACE	MS
MTEXT	MT
OFFSET	O
PAN	'P
PLINE	PL
PSPACE	PS
QSAVE	S
RECTANGLE	RE
REDRAW	'R
REGENALL	RG
ROTATE	RO
SCALE	SC
SELECT BY LAYER	'SL
SELECT BY ENTITY	'SE
STRETCH	ST
TEXT	T
TILEMODE	TM
TRIM	TR
VIEW RESTORE	VR
XLINE	XL
ZOOM	Z
ZOOM P	ZP
ZOOM VMAX	ZV

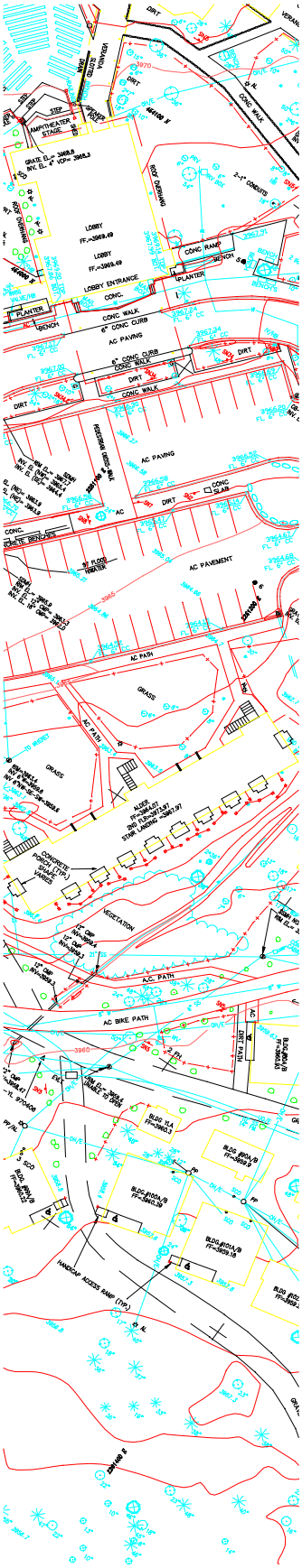
Accelerator Keys

F1	FROM
F2	*Flip screen
F3	Center object snap
F4	Endpoint object snap
F5	Intersection snap
F6	Midpoint object snap
F7	*Grid toggle
F8	*Ortho toggle
F9	*Snap toggle
F10	*Tablet toggle
F11	Nearest object snap
F12	Perpendicular snap

* Indicates Acad for Windows default.

Other AutoCAD Hot Keys

Ctrl+A	Group on/off
Ctrl+B	Snap to grid on/off
Ctrl+C	Copy to clipboard
Ctrl+D	Coords toggle
Ctrl+E	Isoplane toggle
Ctrl+G	Grid on/off
Ctrl+L	Ortho on/off
Ctrl+N	New drawing
Ctrl+O	Open drawing
Ctrl+P	Plot drawing
Ctrl+R	Change viewports
Ctrl+S	Qsave
Ctrl+T	Tablet on/off
Ctrl+V	Paste to clipboard
Ctrl+X	Cut to clipboard
Ctrl+Z	Undo



Appendix H

Contributors/ References

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Contributors/References

Contributors

Cheryl Everman, DSC CADD Coordinator
Management Services, Denver Service Center

Bruce Littlehorn, AutoCAD Support Specialist
Quality Technology Inc.

DSC CADD Standards Committee/Contributors:
Robert Pilk
Steve Schrempp
Bill Shelley
Dave Snow
Al Thornton

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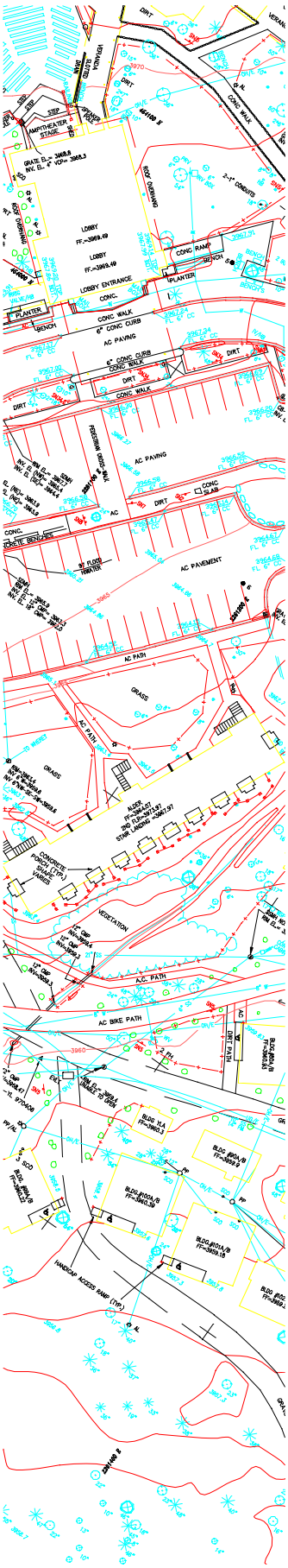
LOBBY
LOBBY ENTRANCE
CONC. WALK
6" CONC CURB
AC PAVING
DIRT
CONC RAMP
PLANTER
BENCH
AC PAVEMENT
AC PATH
GRASS
VEGETATION
AC BIKE PATH
HANDICAP ACCESS RAMP (TYP.)

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